

EDUCATION AND COGNITIVE DIVERSITY: ASSISTING MODEL FOR TEACHING ABOUT MENTAL PREFERENCES

Master Thesis Book

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ABSTRACT

How can educators help their students learn about cognitive diversity? That is to say, how can they help their students learn and appreciate how they tend to work, think, see, or even communicate differently? Everybody's way of thinking and interpreting the environment differs. Some happen to do things in more similar ways, while at the same time they often contradict the approach of some others, and so, it is clear that mental preferences vary between which of us.

Today's trends suggest that we need to learn how to work more productively with each other; trends such as increasing complexity in the challenges we are facing, arguably lead to the use of more diverse teams in organizations. Therefore, we need to understand each other more than before. However, in current education setting, very little consideration —if any— is being made to present students with issues of diversity in team settings. This can even be said for programs aiming to teach students better collaboration skills.

This thesis is part of an ongoing research project that aims to improve our interactions by learning about cognitive diversity. Consequently, this particular thesis book contributes to assist those educators who want their students to understand how diverse they may tend to make decisions and think about things. The extensive literature review conducted to date has led to the researcher's development of a model for thinking preferences based on established studies: including Herrmann's "Whole Brain" theory and the "Human Dynamics" framework by the Seagal et al. The proposed visual model aims to assist educators in easing the learning process and acts as a tool that outlines the essential factors that students can independently use later on in order to identify the thinking preferences of others.

This work also includes an empirical component, which has conducted in two parts, using three qualitative methodologies. In the first part, a number of Aalto University educators were interviewed to better understand their needs in teaching about diversity; so as to clarify that such a need actually exists. In the second part two experiments were conducted on several student groups; one experiment for testing the validity of the proposing model and another one for testing its functionality in practice.

Keywords: Thinking diversity, Whole Brain theory, Human Dynamics, Mental Preferences Model, Qualitative study, Education, Tool

ACKNOWLEDGEMENTS

“Action and reaction, ebb and flow, trial and error, change – this is the rhythm of living. Out of our over-confidence, fear; out of our fear, clearer vision, fresh hope. And out of hope, progress.”

~Bruce Barton, author

It has been a privilege to study International Design Business Management at Aalto University. Because, it opened a window and provided me a better opportunity to proceed with my learning path to the desired fields and explore other possibilities that otherwise would be difficult.

This short section is dedicated for extending my heartfelt thanks to all those who supported my project and me. I would like to thank my mentors, Peter McGrory, Daniel Graff, Matti Vartiainen, and Person Oscar for their guidance and also patience during challenging sessions with me. As well, I would like to thank Markku Salimäki and Kalevi Ekman for providing me support and working space. My deep gratitude also goes to Arthur Carmazzi who has been the source of my early inspiration, and then to Ashkan Shabnavard and Neda Farzam for their support and encouragement. As well, I would like to thank Mikko Koria, Olli Varis, Paula Siitonen, Antti Lehto, and Ari Laitala, who I used their insights. A big thank goes to Naoko Nakagawa, who marked one of my best moments when she informed me I am in IDBM.

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At the end, I wish to dedicate this work to those who thrive to create a better world, the actual purpose and driver of my work.

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ABBREVIATIONS

| | |
|-------|--|
| ADF | Aalto Design Factory |
| CSA | Cognitive Style Analysis |
| FI/FD | Field Independent / Field Dependent |
| IDBM | International Design Business Management |
| HBDI | Herrmann Brain Dominance Instrument |
| MBTI | Myers-Briggs Type Indicator |
| MIT | Massachusetts Institute of Technology |
| MPM | Mental Preferences Model |
| MPP | Mental Preferences Profile |
| MRI | Magnetic Resonance Imaging |
| PDP | Product Development Program |
| SPI | (Belbin) Self-Perception Inventory |
| TMS | Team Management System |
| | |
| E-M | Emotional-Mental personality dynamic |
| E-P | Emotional-Physical personality dynamic |
| M-P | Mental-Physical personality dynamic |
| P-E | Physical-Emotional personality dynamic |
| P-M | Physical-Mental personality dynamic |

1. INTRODUCTION

*“In the old model, the game was ‘do your job and please the boss’ now
it’s about working and learning with people who all differ.”
~Peter Senge, MIT*

Today, we hear much about diversity in teams and in the ways of thinking. Companies bring different perspectives and disciplines to their projects and schools bring them to their study programs. However, teaching about how we think differently so that we could collaborate more effectively together has not been considered as much as it could.

1.1 BACKGROUND

At first, the idea of cognitive diversity and having different thinking styles may seem to be a widely spread concept, particularly in most study programs that bring in a higher level of diversity. However, in most cases students are not being taught about cognitive diversity. Hence, we commonly see teams in which members divide tasks evenly among themselves without considering diversity at all, or in a better situation they may consider one aspect of diversity, which would be related to skills or disciplines, and not the cognitive aspect of it. For example, despite my personal experience throughout my studies, I observed this phenomenon in Product Development Program (PDP) teams in 2011–12, when I was conducting part of this research. And yet, based on studies carried by the ADF Research Team^{*}, it happens a lot that these differences are often mistakenly interpreted to be source of problems in collaboration (2011).

^{*} Aalto Design Factory Research Team

Nevertheless, despite the challenges we may feel, these differences are a source of opportunity and can make our lives richer (Senge, 1997). In 2010, a corporate culture change project opened up a new learning path for me. I learned that the simple truth that ‘we are different’ could be the source of many problems in our interactions. Some aspects of these differences seemed to be more inherent. I have learned that harmful conflicts, frustrations, misunderstandings, trust issues, and motivation issues mostly arise from the differences in the preferred ways of seeing and doing things. I have also observed that the different tendencies were not only coming from their backgrounds (disciplines) or their culture. I then began the journey to understand cognitive diversity. This has guided much of my work ever since. As a designer by background (Visual Communication) and a student of IDBM, seeking to solve problems, I began to explore how others can be helped to notice such diversity and respond accordingly.

First, I became inspired by Ned Herrmann and his concept of “Whole Brain”, and how it could be used to enhance teaching, learning, self-understanding and creative thinking on both individual and corporate levels (Herrmann International, 2006). Thereafter, I learned about “Human Dynamics” introduced by Sandra Seagal. As Senge has also said: “It offers a simple, elegant and powerful framework for understanding the diversity of human functioning and for realizing its potential. It will have an immense impact upon management, education and families. Those of us involved in building learning organizations will look back and wonder how we ever proceeded without the understanding and appreciation of the diversity of human functioning that Human Dynamics brings” (Human Dynamics, 2009). Afterwards, I found these two theories to have very similarities. Then, I started to look for a more usable method for people that could be easily utilized in their future and not a measurement tool or a framework that could be useful merely for managers or experts. By ‘more usable’ according to the dictionary definition I mean (Oxford American Dictionary, 2012):

- Easier to use
- More user-friendly (easier to understand)

- More accessible
- More convenient (involving little effort)
- More intuitive (more able to use what one feels to be true even without hard reasoning)

This thesis aims at proposing a new tool that would assist educators in teaching students about how differently they may tend to work, and help people (in this thesis, students are the end-users) to identify these differences. Therefore, this thesis will explain about Herrmann's Whole Brain model and Seagal's Human Dynamics framework, and then describe the proposed model, which is typically based on those theories. Finally, the new model is explored in practice. Consequently, this thesis was mainly carried out within Aalto University's study programs, and a major portion of this research was conducted for both the IDBM program and Aalto Design Factory.

1.2 SCOPE

According to Vuori (2011), "When people start thinking in new ways they start to behave in new ways". If students learn how to work more productively together, they are able to be more successful in their future interactions and collaborations (Herrmann, 1990). So, people need to understand diversity much more than before, and either schools or universities seem to be the places to educate them. This thesis was built around a proposed model designed to assist educators and students in learning about how they tend to do things differently, and to empower them to identify these differences at subsequent time. The thesis was scoped in the context of Aalto's interdisciplinary study programs. An extensive literature review led to the explanatory model for identifying the way we think and tend to do things differently (see figure 1).

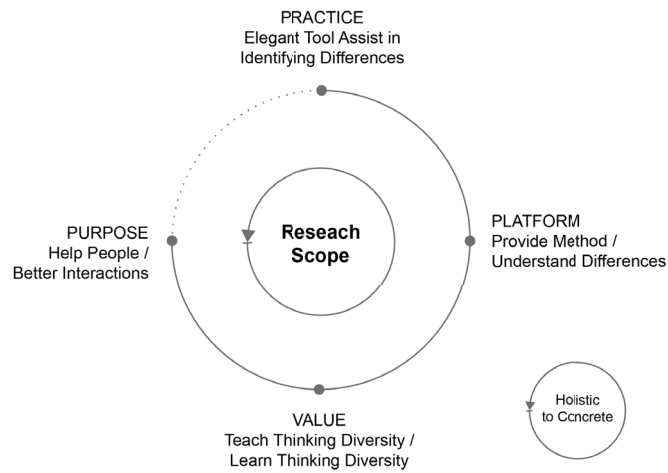


Figure 1. The research scope; how the thesis scope has been narrowed down from a holistic view

Starting from diversity in general and then cognitive diversity in particular (see figure 2), the theoretical part is followed by the essential description of two guiding models, 1) Whole Brain and 2) Human Dynamics, as the basis for the creation of the proposed model. Thereafter, the new model is described. Then, thesis moves to the practical part to answer the research questions concerning the new model.

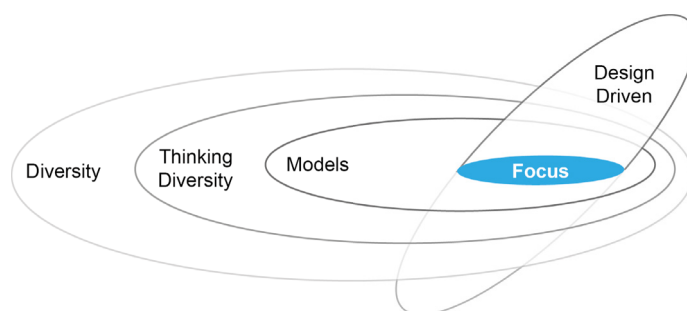


Figure 2. The focus area of thesis

Notably, the research project that this thesis is part of, has strived to find a method in order to help people identify each other's thinking style and preferred way of working in an elegant way, and by elegant, it means (McGrory, 2011): minimum (perceived) effort + maximum (positive) impact.

The research project contributes to more sensitive observation and listening in interpersonal interactions, and further, to acquire another person's thinking style without relying on an external processing tool (from a third party). This thesis contributes to the teachers who are seeking more suitable ways to improve the learning process about different thinking preferences.

*"Your topic
is very
interesting
& valuable
for IDBM."
~Markku
Salimäki,
head of
department*

1.3 OBJECTIVES

This thesis is focused on three primary objectives in two main parts: the first part explores the needs of educators, especially to understand whether there is actually a need for a new method like to the one proposed. The second part focuses on the practical application of the model:

Part A

1. Exploring the educators' needs in terms of improving learning of their students about thinking diversity*.

Part B

2. Determining the validity of the proposed model.
3. Understanding whether the proposed model is functional and usable for teachers.

These objectives are achieved through conducted three studies in the format of qualitative research. These studies were carried out empirically by studying some of educators (for part A) and experiments with students inside Aalto University (for part B).

* In this thesis book, 'thinking diversity' is carrying the same meaning as 'cognitive diversity' and therefore these entities may be used interchangeably.

1.4 STRUCTURE

This thesis is divided to five main chapters as shown in figure 3. The first chapter starts with an introduction to the area of interest of this thesis, states the background and relevance of this thesis, and presents the scope and objectives. The second chapter comprises the theoretical background of the thesis, including diversity in general, the cognitive diversity phenomenon, an introduction to some models related to understanding diversity, and then describes the design of a (proposed) practical model. The third chapter contains three qualitative methods, each to respond to one of the three research objectives. One is based on interviews with teachers regarding the first objective (part A). The other two are experiments conducted on students to discover whether the proposed model meets the objectives (of part B). The next chapter presents the findings in relation to the research objectives, and the final chapter discusses the findings, their practical implications, evaluates the studies and limitations, and proposes further research opportunities.

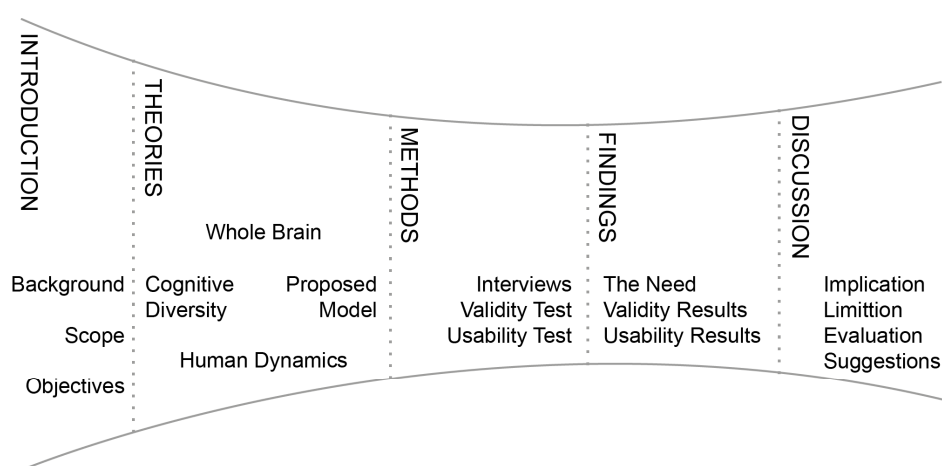


Figure 3. The structure of this thesis book

2. THEORETICAL BACKGROUND

"We are all equal in the fact that we are all different. We are all the same in the fact that we will never be the same... I will not blind myself and say that my black brother is not different from me... But my black brother is he as much as I am me... In the wrong message that we should see everyone as the same... is the root of the failure of harmony... We are not the same! ...We are all different! But the key to this door is to look at these differences, respect these differences, learn from and about these differences, and grow in and with these differences... that's beautiful."

~C. Joybell C., poet

There are two trends in organizations. One is increasing diversity and the other is the emerging use of teams (Schilpzand, 2010). We see that product design teams are a growing phenomenon (Kichuk & Wiesner, 1997). Being more diverse helps companies to be more innovative and better understand their environment (Forbes, 2014). However, according to Peter Senge (1997), director of the Center for Organizational Learning at MIT, teams are only really teams when people try to understand each other and how to work productively together. At the same time he notes: "Today we hear much talk about knowledge-based economy or knowledge & learning as key competitive advantage in business. What we often don't realize is that behind such statements: we must understand people better and more deeply than ever before". Stephen Covey (2012) once said: "strength lies in differences, not in similarities". However, the challenge is that to use the differences, we are required to make distinctions. If we do not intentionally include these differences (by being unable to make distinctions), then we may unintentionally exclude them (Forbes, 2014).

"Difference is the wellspring of innovation."
~Peter Senge

2.1 GENERAL THEORIES

As Senge (1997) noted, “People are all different”, and since our lives are rich in interpersonal interactions, learning about diversity is highly important. This is why a majority of Fortune 1000 firms run diversity management training courses (Grensing-Pophal, 2002). Such learning can expand our knowledge base, enhance self-awareness and social development, prepare us for future career success, and promote creative thinking (Hyman & Jacobs, 2009). In the past, diversity was not much appreciated. If we look at the industrial age, people were fundamentally seen as laborers, the notion being that they are in fact just one type of resource (for companies). The process of producing products considered them as an input like other resources such as raw materials and energy (Senge, 1997). In the same era, however, the education systems were forming according to the needs of the industrial age (Robinson, 2010). Most of them in the world are still modeled on that, but the industrial-age view is changing. Diversity is becoming more important to be understood and used.

*“Understanding a system means understanding the people who make up that system. And those people are all different.”
~Peter Senge*

2.1.1 DIVERSITY

Diversity is the concept of “differences among members of a ‘team’ with respect to a specific attribute” (Joshi & Roh, 2007). It is believed that diversity has a bearing on performance (Schilpzand & Martins, 2010). However, it is also found to have negative effects on team function as well, particularly at the emergent of conflict and communication (Kress, 2012). Therefore, it is important to differentiate the aspects of diversity (such as: discipline, background, culture, gender, age, cognitive style, etc.) to potentially find out strength of their relation to team process and outcome. Each may vary in their role and in their importance in the function of team. They can be identified in two main categories: surface-level and deep-level (Schilpzand, 2010). Surface-level diversity are so obvious and can be visibly detected like sex, age, and ethnicity, whereas deep-level diversity are harder to be

determined. For example: personality, knowledge, beliefs, and values. These may become apparent only after a while interaction with a particular person (Harrison et al., 1998). These two types are different in their effect on team's outcome. Deep-level diversity is more likely to have positive effect on the team outcome and are more job-related than surface diversity that is less job-related, and tend to affect the team negatively (Schilpzand, 2010). Large diversity, however, may still show negative effect on team's outcome, related to friction, negative conflict, and turnover (Pelled et al., 1999).

Increasing use of teamwork and increasing diversity needed for dealing with issues in our complex environment has been a rapidly growing phenomenon in the last decades. Teams and groups are different in terms of definition. Team is a form of group, but a group is not necessarily a team (Klimoski & Mohammed, 1994). In teams, individuals have independent tasks, while having common goals and share responsibility for achieving them (Cohen & Bailey, 1997). This distinction could be important because teams are more likely to need more understanding of deep-level diversity. In addition, teams have been classified depending on the angle of view. There are four general types of these teams: advice teams, production teams, action teams, and project teams. Advice teams serve to expand the information base for managerial decisions, production teams conduct daily routine tasks, action teams carry out peak performance on demand for brief events (e.g. surgery team), while project teams are for creative problem-solving (Sundstorm et al., 1990). Project teams generally do not exist rather than when formed for a specific need in a limited amount of time. Considering the type of team could be important in order to understand the effect of a particular aspect of diversity on the team. For example, project teams are typically for decision-making and problem-solving that should apply diverse perspectives. Diversity in knowledge and cognitive resources is been suggested to have positive relationship with team's creativity and decision-making quality (Williams & O'Reilly, 1998). Since complex decision-making –which is often a task for project teams– would benefit from multiple people rather than from an individual perspective. As a result, even though it is not clear that how different

"We got better results not focusing on the task but focusing on how people work together."
~David Marsing, vice president, Intel Corporation

viewpoints translate into higher performance in these teams and it needs to be understood better (Ilgen et al., 1995), still they have the advantage of using this diversity. Despite the benefit of selecting the optimal combination of team members, the teams must be composed of people who work productively together and understand one another (e.g., Senge, 1997). Unfortunately, this hasn't received much of attention in practice (Kichuk & Wiesner 1997).

2.1.2 COGNITIVE DIVERSITY

Cognitive diversity is perceived as the differences in thinking styles (Dahlin, Weingart, & Hinds, 2005). It is a term in the field of Cognitive Psychology and a key concept in the fields of education and management. Yet, the exact meaning of the term 'cognitive style' has caused controversy. Cognitive style is the way an individual consistently prefer for manipulating and processing information (Harrison & Bramson, 1984; Mayer, 1983). These preferences seem to be stable over time and highly resistant to change (Riding & Pearson, 1994). Therefore, cognitive style diversity concerns differences among people with regards to how they process information rather than diversity in the content of the information they bring to a group or team due to their background, education, etc. Further, in Sternberg's (2001) definition, cognitive styles are the 'preferred way of thinking' and they are 'not an ability but rather how we use our abilities'. Moreover, it has been also suggested that they are "predominantly the result of socialization" meaning that cognitive styles are learned e.g. as a student practicing in particular styles (Sternberg & Zhang, 2012). In a like manner, styles are affected by class background, gender, culture, etc. This demands for considering the implications of cognitive styles in teaching and learning resources, for promoting diversity (Jones & Reid, 2007). Yet, it has been also proposed that the difference in our styles of processing information is fundamentally coming from our brain —our processor. All, even what is learned is in there. However, on the contrary to what Sternberg and Zhang propose, recent genetic studies, suggest that some aspects of personality traits are coming from our genes. The studies are

*"Society must
recognize that
different people
think in
different ways"
~Temple Grandin,
Prof. Colorado
State University*

not at the stage that (perhaps) they can fully uncover the mystery, but at the same time thinking that genes do not have any bearing on our styles would be wrong (e.g. Kraus, 2013).

Our brain is a complex organ; the ‘100 billion neurons that enable us to function. Being by eighty percent water, according to Daniel Amen (2010) its form is more like ‘custard butter’ than like a ‘sponge’ and even though being protected by a hard skull, receiving injuries is not hard after all i.e. not suitable for hitting balls or boxing. The functioning of brain is linked to its health. Any brain injury (of any kind) has the potential to affect or change the function of this organ.

“Although every brain is unique, all brains are electro-chemical.”
~Ned Herrmann

For example, this phenomenon has been observed through MRI scans by Amen (e.g. figure 4) who argues that even some behaviors or lack of certain functions can be based on an accident in the childhood of a person who may barely remember it. Similarly, there are also other studies reflecting on brain’s function affected by food, or harmed by alcohol, drugs, certain diseases, aging, etc. However, this study did not find any direct indication relating these effects to ‘cognitive styles’ rather than ‘cognitive abilities’.

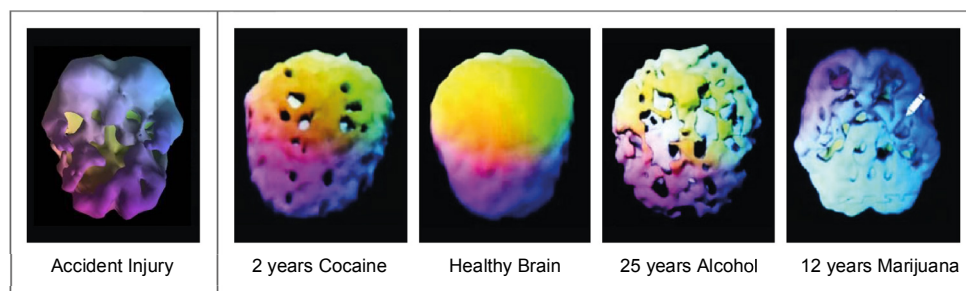


Figure 4. Scanned images of the brain by Daniel G. Amen M.D. (2004; 2010), illustrating examples of which has led to lack of proper functioning of brain

Technological advances have made numerous ways to peer into brain and see how it works from a cellular level and see what parts activate upon what stimuli (Habermacher, 2011). Findings in Cognitive Science are leading to understand how our brains are wired up and how the wiring makes us who

we are. Sebastian Seung professor of computational neuroscience at MIT calls this wired system (shown in figure 5) “Connectome” (2013). He believes one day we will be more than just our genes —“a rewired man for better”. But till then, we seem to be limited to our genes and then to what being affected by the environment and experiences.

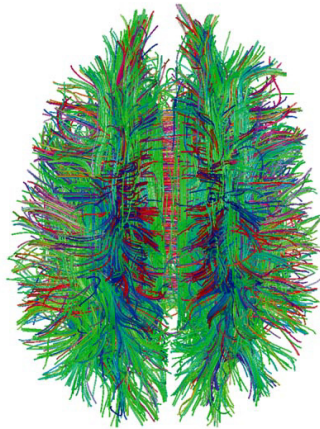


Figure 5. The human ‘Connectome’; the image show the fiber architecture of the brain (Hagmann et al. 2008)

Each person favors a particular method of thinking. Each person perceives and interprets the environment in his or her own way. This influences a lot how we approach the world, reason, make decision, and communicate (Golian, 1998). Cognitive diversity is one of the deep-level aspects of diversity. So it is not an obvious type of diversity and may become apparent only after a while interaction with a particular person (Harrison et al., 1998). As Schilpzand (2010) argues, team cognitive diversity affects a teams’ mental model and this in turn will influence performance. Cognitively diverse teams posses a wide range of opinions and perspectives thereby increasing the pool of knowledge or in other words ‘a bigger brain’. Therefore, it is expected that diverse teams present a higher performance than homogenous teams in decision-making tasks. However, it may not improve the outcome when it comes to routine tasks, but when dealing with complex tasks that require creativity like problem-solving tasks, it can play a key role (Page, 2008).

*“I bet if you
have two
children or
more, they are
completely
different than
each other,
aren’t they.”
~Sir Ken
Robinson*

Regarding the effect of cognitive diversity on teams, in contrast with popular view, some researches point at its negative effects on teams' outcome. For example Hambrick and colleagues (Hambrick et al., 1996) found that while top management teams that varied in cognitive resources were more likely to undertake bold competitive action, they also exhibited friction and were slower in decision-making. Similarly, Miller et al. (1998) found that actually cognitive diversity caused harmful issues, rather than helped, in comprehensive decision-making and long-term planning in executive teams. Cognitive diversity just by its existence in team alone may devolve into harmful conflicts and frustration and it has to be managed (HBDI, 2013). Thus, diverse decision-making teams seem to need more time to explore their differences and quite possibly work through conflict and disagreements (Hambrick et al., 1996). Eventually, there is evidence for both the positive and negative impacts of cognitive diversity on performance, which makes the examination of moderators an important next step. However, on average, most researchers argue that cognitive diversity should be beneficial for team performance (Knippenberg & Schippers, 2007).

In general, there are plenty of similar studies regarding how or either if cognitive diversity affects people in collaboration (negative or positive). However, it would be difficult to find studies that directly respond if 'learning about cognitive diversity' is harmful for a team or people. Perhaps, the mindset of learning has forced out doubts in this realm.

Since everybody thinks differently, cognitive diversity thereby exists everywhere and in every field of discipline as well. Even though that some fields demand certain ways of thinking, but still this diversity exists even if it is in a lower profile. In project teams on the other hand, it is believed that its existence (because of bringing different perspectives) plays an important role related to creativity and decision-making (Williams & O'Reilly, 1998). This study is not aiming to dig for finding whether cognitive diversity is beneficial for project teams, but it is aimed at helping students to understand cognitive diversity so they can learn to improve their collaboration (specially in teams).

*"For my
thoughts are
not your
thoughts,
neither are
your ways,
my ways"
~Sheldon Kopp,
Psychotherapist
& Author*

Peter Senge proposes (1990) in the theory of 'learning organization' in his book 'The Fifth Discipline' that learning is a characteristic of adaptive organizations that are able to adapt to their environment (both internal and external) accordingly. Thus, it implies the importance of learning about cognitive diversity in project teams, which is also a kind of (temporary) organization. In any case, "If different minds are nurtured and brought together, they should be able to solve new and complex problems" (Grandin, 2012).

2.2 MODELS IN BRIEF

The study of mind and how it operates has existed in pre-history Greece. The philosophical thoughts on the nature of human knowledge are found documented since then (i.e. in Plato's and Aristotle's texts *Meno* & *De Anima*). These studies had been typically under philosophy's flag for long time. It includes thinkers and writers such as Descartes (17th century, France), Locke (17th century, England), Spinoza (17th century, Dutch), Leipzig (18th century, Holy Roman), Hume (18th century, Scotland), Kant (18th century, Prussia), who their work, ultimately helped in the development of Psychology. It was until 19th century that study of mind became a duty of experimental psychology. At that time, Wilhelm Wundt and his students initiated laboratory methods that would study mental operations more systematically (Stanford Encyclopedia of Philosophy, 2010).

2.2.1 MYERS BRIGGS

In 20th century, Carl Jung (1923) introduced the theory of psychological types. He observed that people in general either take in information (perceiving) or organize information and come to a conclusion (judging) and people prefer to perform one of the functions. He also found a person seem to be energized either by external world (extraversion) or the internal world (introversion). Thus, a person's psychological type is upon the preferences in

each category. Moreover, Jung (1923) suggested that there are four cognitive functions by which people experience their environment. Even though all four functions can be used (dealing with different situations), but still, each person favors one of them more dominantly since they are preferences not ability. As shown in figure 6, these functions are: sensation and intuition related to information gathering, and also feeling and thinking that are related to decision-making (Kaplan & Saccuzzo, 2009). Later in 1940s, Isabel Briggs Myers and Katharine C. Briggs, sought to make a framework for easing the use of Jung's theories, thereby proposed Myers-Briggs Type Indicator (The Myers & Briggs Foundation, n.d.). MBTI is set out to identify the preferences related to each of the four dichotomies specified or implicit in Jung's theory of psychological types and it does not measure trait, ability, or character. Based on the variables, sixteen personality types have been described (Myers, 1962). See Appendix A for explanation of the types. The function pairs according to The Myers & Briggs foundation (n.d.), shape four different styles:

"What appears to be random behavior is actually the result of differences in the way people prefer to use their mental capacities."
~Carl Jung

1. Sensing + Thinking
 - *Prefers objective and analytical manner.*
 - *Prefers focus on realities and practical applications in working.*
 - *Interested in careers with technical approach to things.*
 - *Less interested in careers dealing with nurturing others.*
 - *Often found in management, applied sciences, banking, construction, production, police & military.*
2. Sensing + Feeling
 - *Tend to be people-oriented in life and work.*
 - *Like to focus on realities and hands-on careers.*
 - *Often in careers requiring sympathetic approach to people.*
 - *Less interested in analytical and impersonal careers.*
 - *Often found in Health care, childcare, teaching, sales, etc.*
3. Intuition + Feeling
 - *Tend to approach life and work in enthusiastic manner.*
 - *Prefer to focus on ideas and possibilities particularly for people.*
 - *More into careers for communication skills & focus on abstract.*

- *Less interested in careers with impersonal, technical approach, & dealing with factual data*
 - *Often found in arts, counseling, psychology, education, etc.*
4. Intuition + Thinking
- *Prefers logical and objective manner in life and work.*
 - *Like to focus on possibilities with technical application.*
 - *Often into careers with impersonal and analytical approach.*
 - *Less interested in sympathetic work & hands-on helping people.*
 - *Often found in sciences, law, computers, engineering and technical work.*



Figure 6. MBTI four dichotomies (Myers-Briggs Foundation, n.d.)

2.2.2 BELBIN TEAM ROLES

During 1970s Meredith Belbin, created another test called Belbin Self-Perception Inventory (SPI), commonly known as Belbin Team Inventory. This tool was the result of his observations of teams. He found eight distinctive 'team roles' at the time, indicating individuals' different reactions to a same team environment. But a ninth role was emerged later (Belbin Associates,

2012). Briefly, Belbin (1993) identified the nine ‘team roles’ as: plant, investigator, co-ordinator, shaper, monitor, teamworker, implementer, finisher, and specialist (see Appendix B). It is argued that teams with high performance require the balance of those roles; a balance of categories (figure 7): thinking (plant, monitor, & specialist), people (investigator, co-ordinator, & teamworker), and action (shaper, implementer, & finisher) roles (Belbin, 1993).

“A team is a congregation of individuals, each of whom has a role which is understood by other members.”
~Meredith Belbin

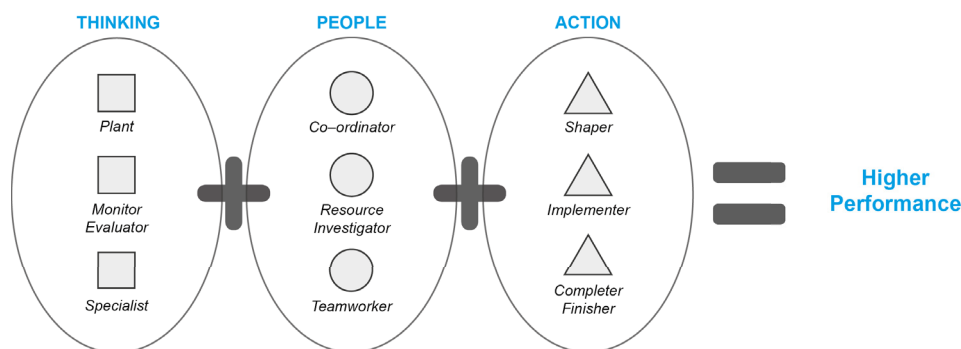


Figure 7. Belbin team roles equation; according to Belbin (1993)

2.2.3 TEAM MANAGEMENT SYSTEM

Dick McCann and Charles Margerison (1985) established one other assessment instrument almost similar to Belbin’s SPI. It is now known as ‘Team Management Systems’ (TMS). The Team Management Index “outlines individual’s work preferences in the areas of decision-making, team building, leadership, information management, organization and personal relationships” (McCann & Margerison, 1985). The instrument is based on a questionnaire that produces a profile report of an individual. The Team Management Wheel (figure 8) however, is a further developed visual model for displaying work preferences found in high performing teams (Appendix C). This tool highlights “two or three sectors which describe a person’s major strengths” (McCann, Margerison, & Davies, 1986). They also discovered four key managerial work preferences (figure 9) related to relationships, information, decision-making,

and organization (McCann et al., 1986).

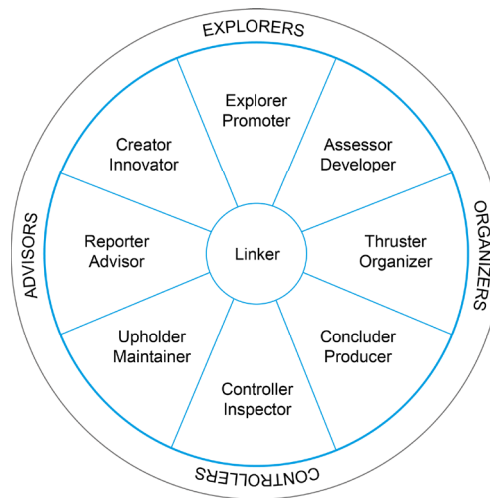


Figure 8. Team Management Wheel; based on McCann, Margerison, & Davies (1986); visual model for displaying working preferences

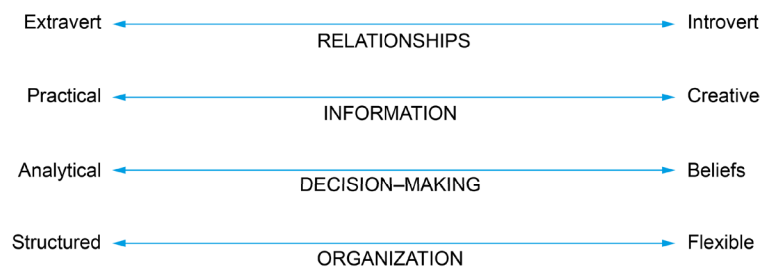


Figure 9. Key managerial work areas & preferences; based on McCann, et al. (1986)

According to McCann and Margerison (McCann et al., 1986), the role preferences would be briefly as following descriptions; note that in their opinion, linkers are those who have learned linking skills to manage their team:

1. Creator-Innovator

Ideate, challenge the status quo, wish to experiment, go beyond structures, like varieties, willing new ways of thinking, and 'way-out' ideas...

2. Explorer-Promoter

Good to take up an idea and get people enthusiastic about it, compare new ideas with current status, bring resources & contacts, see the big picture rather than details, push & talk on subjects that even are not their expertise, easily move from one project to another...

3. Assessor-Developer

Interested in innovating & developing, seek for means of making an idea practical, often produce prototype or conduct market research, not interested in routines...

4. Thruster-Organizer

Make things done, once convinced they plan to move ideas into reality, plan people & systems, task-oriented, timely, tend to control environment rather than let it control them...

5. Concluder-Producer

Produce product to a standard, do routines, like being aligned with the plan, use existing skills rather than continuously changing ways of doing...

6. Controller-Inspector

Enjoy detailed work, assure that facts are correct, careful, systematic, concentrate on long-term, often work solo, like to pursue things in depth, accurate, financial, detect errors...

7. Uphold-Maintainer

Have views on how things should be done, supportive, provide stability & consolidate, defending the team against criticism, tireless & unselfish to assist, put things in order before starting the work, unwilling to change unless necessary, prefer working under control-oriented support, do things according to self standards, prefer advisory support role rather than executive leadership...

8. Reporter-Advisers

Generate & gather information, patient, postpone decisions due to insufficient information, do not seem interested to organize others, assure that the results are correct, thirst for details may drive them for personal risks for activities on which they report...

2.2.4 BIG FIVE

It seems that during 1980s, a model called 'Five Factor' traits (e.g. Norman, 1963), drew lots of researchers' attention (e.g. Costa & McCrae, 1985) and led to a personality inventory. The big five personality construct (figure 10) is consist of the following dimensions (McCrae & Costa, 1997):

1. Extraversion

Level of: sociability, talkativeness, and emotional expressiveness...

2. Agreeableness

Level of: trust, kindness, altruism (or selflessness), affection...

3. Conscientiousness

Level of: thoughtfulness, impulse control, goal-directed...

4. Neuroticism

Level of: instability in emotions, anxiety, moodiness, sadness...

5. Openness

Level of: imagination, insight, range of interests...

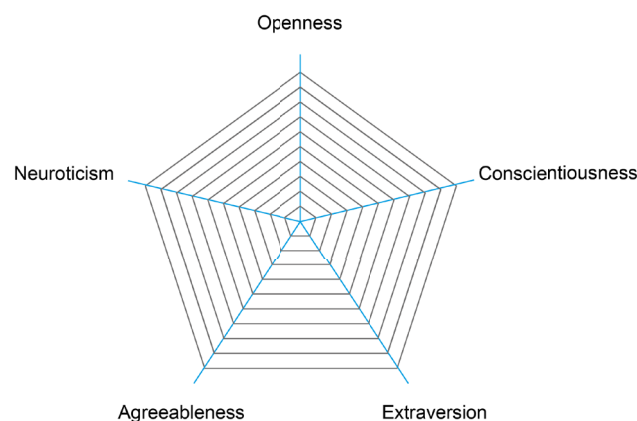


Figure 10. Five Factor Traits (McCrae & Cost, 1997)

Despite the belief that these traits are universal, it is argued by some scholars that these traits also have origins in biology (e.g. Buss, 1995).

2.2.5 FIELD DEPENDENCE

Herman Witkin was a psychologist who proposed a one-dimensional model of variation known as 'field dependence –one of the earliest in the study of Cognitive Science. It tries to identify the cognitive styles field dependent or field independent. Field-independent people tend to be more autonomous when it comes to the development of restructuring skills, which are required during technical tasks when the individual is not necessarily familiar with them. They are, however, less autonomous in the development of interpersonal skills. (Kirton, 1978). A simple test developed by Witkins was to put a person in a dark room with a visible rod and a frame and the person try to line up the rod in the frame which may itself be aligned vertically or with an angle. As shown in figure 11, with field independent style, the person ignores the frame and aligns the rod. However with field dependent style, the person is concerned with the position of the frame and fails to align it vertically.

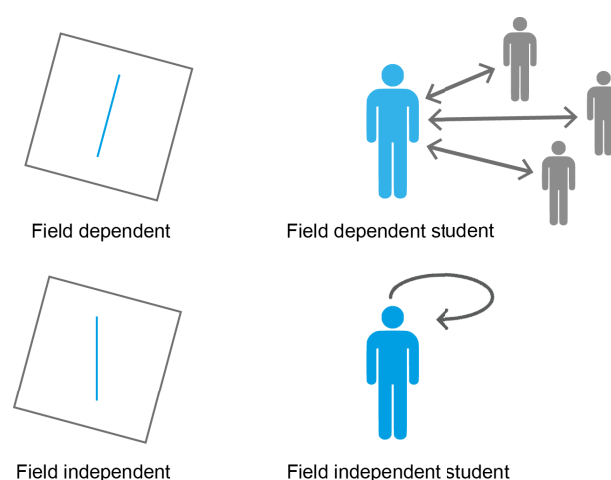


Figure 11. Field dependent/independent style (Chapelle & Heift, 2009)

2.2.6 HEMISPHERE DOMINANCE

In the late 19th century, when scientists highlighted the difference between the right and left cerebral hemisphere in functioning, it led to the growth of the importance and validity of hemispheric specialization (Corballis, 1991). Later, the right brain-left brain theory grew out of the work of Roger W. Sperry (1968), who was awarded the Nobel Prize in 1981 for his discoveries on split brains. Essentially, he showed that if for an individual, the two hemispheres of his brain get disconnected (from the large band of fibers that connects them), that person demonstrates two functionally different brains (Nobel Prize, 1997). We have heard about left brain-right brain theory or Ornstein's theory on hemispheric lateralization (1974), which posits that the left hemisphere of the brain controls logical and analytical operations while the right hemisphere controls holistic, intuitive and pictorial activities. Left-brain specialized for language, mathematics, detailed analysis, logical thought, temporal and sequential analysis, and serial processing of sensory information while having right-brain specialized for emotional expression, intuition, recognition of faces, and the emotions expressed in faces, artistic achievement, recognition of musical passages, visual-spatial analysis, and parallel processing of sensory information (e.g. Goldstein, Scholthauer, & Kleiner, 1985; Efron, 1990). However, Hines (1987) argues that findings from brain lateralization has been promoted far with exaggeration sometimes in public and became more like "hemispheric mythology" (figure 12) in contradic with the research's nature. For example he criticizes Mintzberg's (1976) take on subject for managerial training (planning on the left and managing on the right).

*"Both the left
and the right
hemisphere
may be
conscious
simultaneously
in different,
even in
mutually
conflicting,
mental
experiences
that run along
in parallel"
~Roger W.
Sperry*

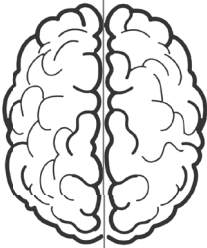
| LEFT HEMISPHERE | | RIGHT HEMISPHERE |
|--|---|--|
| <i>Speech</i> <i>Verbal</i> <i>Mathematics</i> <i>Analytic</i> <i>Linear</i> <i>Intellectual</i> <i>Sequential</i> <i>Controlled</i> <i>'Serial processing of sensory information'</i> |  | <i>Emotional</i> <i>Spiritual</i> <i>Intuitive</i> <i>Creative</i> <i>Visual</i> <i>Musical</i> <i>Spatial</i> <i>Facial Recognition</i> <i>'Parallel processing of sensory information'</i> |

Figure 12. Hemispheric mythology; specialization of both hemispheres (Herrmann, 1996)

2.2.7 TRIUNE BRAIN

Robert Efron, in his book 'The decline and fall of hemispheric specialization', regarding specialization of each hemisphere, notes that almost no one today accepts them as valid generalization (1990). "We have known for at least 30 years that this characterization is incorrect" (Willingham 2010). Herrmann (1996) also argues that there were researchers who worked on 'the specialized brain' (i.e. Ornstein) and provided convincing evidence that the difference in specialization were located in each half of brain and soon it was carried out by other researchers and the press media, all who promoted this idea. But it fell shortly. After mid 1970's, the concept of Triune Brain became familiar which was the result of Paul MacLean's study on the evolution of human brain. Herrmann (1996) argued that in most cases he found, the limbic system of brain was not mentioned while it has a well-known role in emotional processing. Triune Brain (shown in figure 13) is the same concept that Simon Sinek (2010) uses for explaining his commercial 'Golden Circles' model.

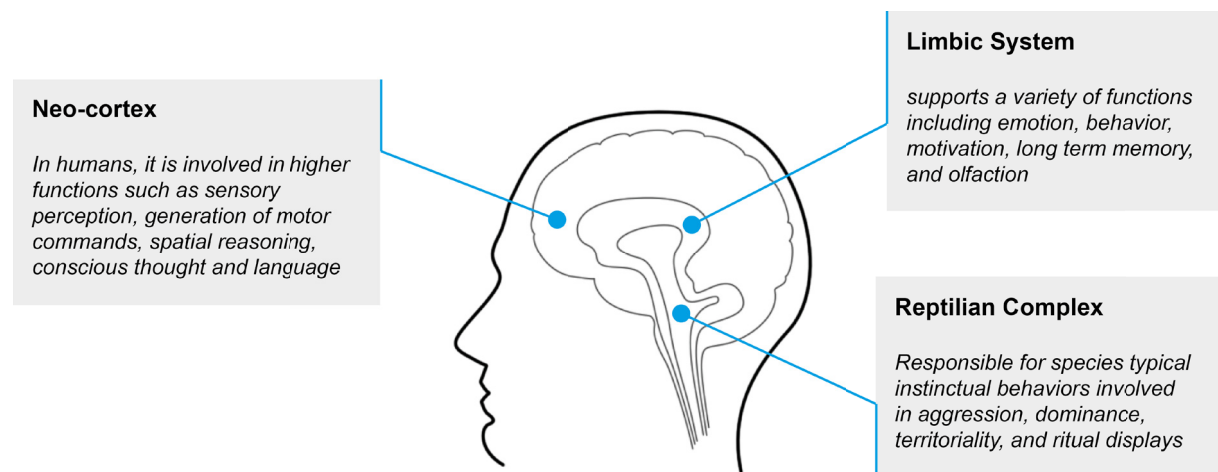


Figure 13. Triune Brain; model proposed by Paul MacLean (1972)

2.2.8 ADAPTION-INNOVATION THEORY

Another kind of model was proposed by Michael Kirton (1976), called Adaption-Innovation theory. He observed that people “produce qualitatively different solutions to seemingly similar problems”. Some people prefer the adaptive approach to problem solving, while others prefer other ways and tend to innovate. Adaptors tend to solve problems by means of what they have been provided through time and learnt techniques. However, innovators tend to solve them alternatively differently and by the help of innovative technologies (see figure 14). He suggests that innovators strive to surpass the paradigms, which adaptors prefer to work within them but desire to do them better. Hence, his model of cognitive styles is essentially for problem-solving styles. “By understanding the differences between adaptors and innovators, leaders can better influence and manage teams of people who are diverse in their cognitive styles” (Stum, 2009).

| | |
|--|---|
| Adaptors prefer to: <ul style="list-style-type: none"> • Do the same things better • Detail required and provided - efficiency • Structure enables • Work to the rules • Group consensus • Sufficiency of originality – a few safe and relevant ideas | Innovators prefer to: <ul style="list-style-type: none"> • Do things differently • 'Broad-brush' required and provided - efficiency • Structure limits or restricts • Challenges/breaks the rules • Creates dissonance in groups • Proliferation of originality – many ideas |
| Adaptors see innovators as: <ul style="list-style-type: none"> • Unsound, impractical • Abrasive • Cavalier towards others' ideas • Generators of turbulence • Creating confusion and dissonance • Risky • Challenging rules and customs | Innovators see adaptors as: <ul style="list-style-type: none"> • Timid in ideation • Compliant with authority • Stuck within their system • Picky, narrow, pedestrian • Taking an 'in group' view • Overly cautious • Conforming • Intolerant of ambiguity |

Figure 14. Tendencies of Adaptors & Innovators (AIA D.E.L.P., 2010); the figure also presents how each group (typically) perceive the other one

2.2.9 COGNITIVE STYLE ANALYSIS

In the last decade of 20th century, some other tools and frameworks were brought up to the table. For example, Richard J. Riding (1991) suggested a two-dimensional model known as Cognitive Style Analysis (CSA). The test measures two fundamental dimensions: Wholist-Analytic and Verbal-Imagery (Riding & Cheema, 1991). The Wholist-Analytic dimension reflects how a person organizes and structures information. Wholists tend to retain the overall view of information, whereas Analytics cascade the same information into its component parts to absorb. The Verbal-Imagery dimension reflect on individuals' processing mode of information in memory while thinking. Verbalizers process information in words, whereas Imagers process information in mental pictures. However, some scholars criticized CSA test for the reliability of its results (i.e. Rezaei & Katz, 2004).

2.2.10 WHOLE BRAIN

Based on theories on halves of cerebral cortex (hemispheric lateralization) and specialization of brain's cerebral cortex and limbic system (triune brain), Ned Herrmann (1996) proposed a four-quadrant model named as "The Whole Brain Model" (figure 15). In the model there are four quadrants each identifying a particular mode of thinking: Analytical Thinking, Sequential Thinking, Interpersonal Thinking, and Imaginative Thinking. Herrmann Brain Dominance Instrument (HBDI) was created then as a measurement tool to describe thinking preferences in people. However, The hemisphere dominance used (metaphorically) in the base of the Whole Brain model, has received some criticism, notably by Hines (1991 & 1987). Hines criticizes Herrmann's model by the fact that he has based some of his views on hemispheric specialization. For example, relating creativity to the right hemisphere, or suggesting a questionnaire that determines whether which hemisphere is dominant in a person.

*"Most of us
assume we
are seeing the
world the way
it really is."
~Ned
Herrmann*

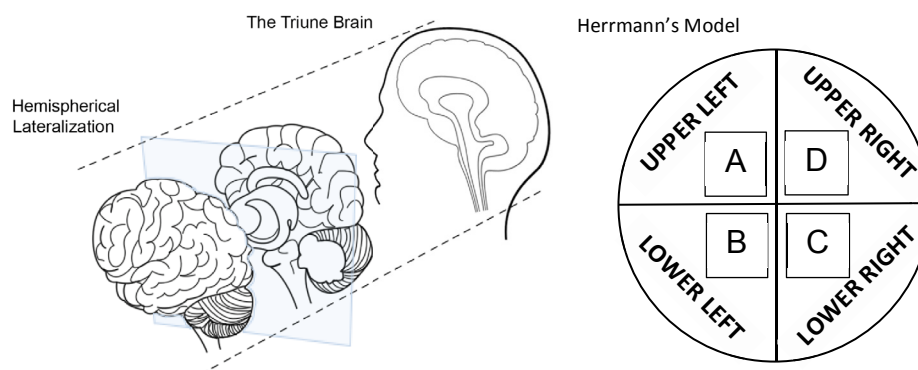


Figure 15. Herrmann's (1996) four quadrants model; a merger from the two theories of Hemispheric Lateralization and The Triune Brain

HBDI has been proposed to determine thinking preferences in individuals. This assessment tool has been based on Herrmann's (1995 & 1996) extensive research on brain dominance. Herrmann began studies of the

brain in the field of business, when he was working in GE (General Electric) responsible for management education (training programs) in that corporation. There, he developed and validated HBDI initially as a survey to profile participant's thinking styles and learning preferences (figure 16) in the training workshops. This consequently led to the development of Whole Brain model. Herrmann (1995) conducted studies showing that his instrument (HBDI) is valid and reliable for measuring thinking preferences when used in professional way and approved scoring method. The tool is proven useful to determine thinking preferences of students and also can enabling educators to design and deliver content to students for developing their potential (De Boer & Van der Berg, 2001). According to HBDI (2013), the instrument is a 120-question form that at the end can profile the measures in the circular model and display the comparable tendency toward each quadrant.

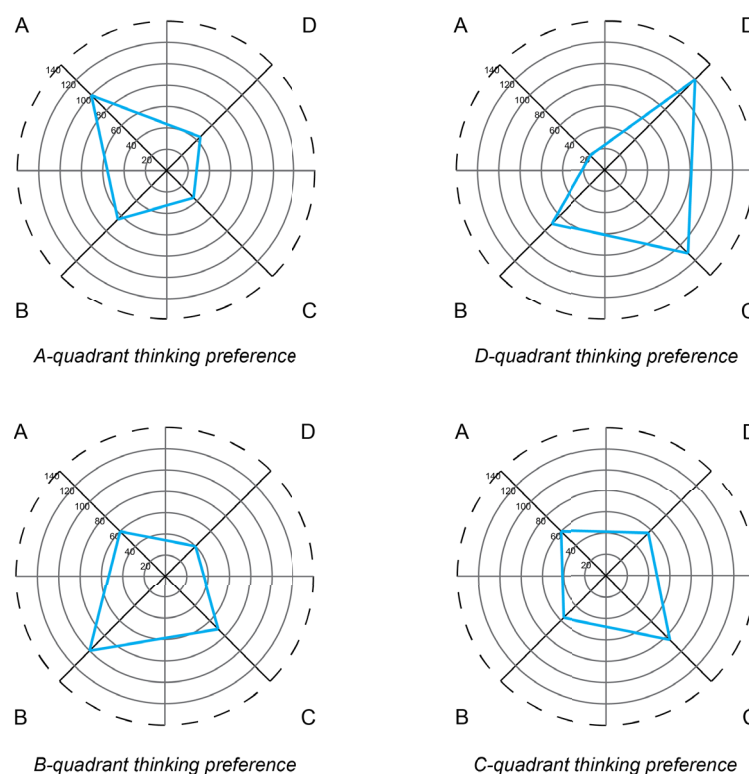


Figure 16. HBDI profile samples (Herrmann, 1996)

In the Whole Brain model, the four quadrants describe processing modes (figure 17). However, people often prefer some of them to the others (Herrmann, 1996). In pursuing the nature of creativity, Herrmann (1990) concluded that: “if brain is truly the source of creativity (and it must be), then all human functioning is affected by the way we think.” However, by pointing to the fact that ‘creativity’ means different to each of us, he explains creativity “as ability to challenge assumptions, recognize patterns, see in new ways, make connections, take risks, and seize upon a chance.” As a result, this will favor the ‘D quadrant’ (upper-right) of his model for higher ability for creativity (figure 18).

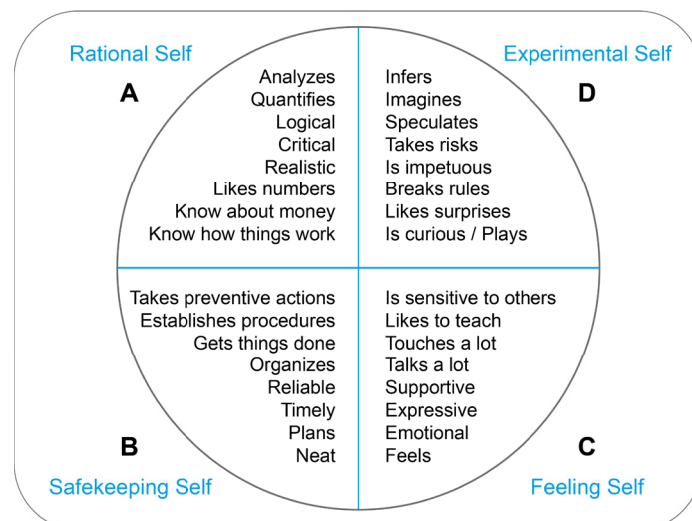


Figure 17. Four different selves and processing modes (Herrmann, 1996)

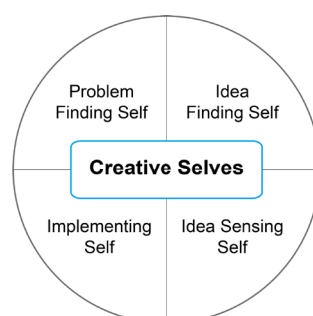


Figure 18. The creative selves (Herrmann, 1996)

Moreover, Herrmann (1996) also believed that preferring any of the quadrants to the other, brings a specialized way of communication (language of brain dominance). Hence, two different styles of thinking potentially carry different levels of difficulty when communicating to each other (figure 19 & 20). Interpersonal communication in general, is least difficult for the people of the same type and would be most difficult for the types in cross of each other.

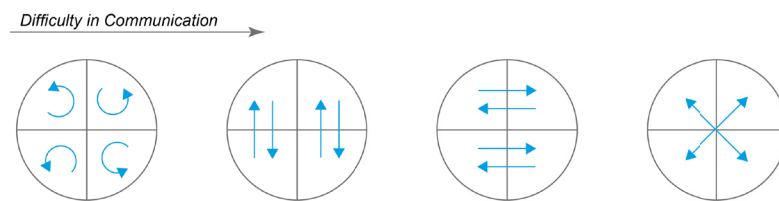


Figure 19. Impact of processing modes on communication (Herrmann, 1996)

Reporters' views of same accident:

A. [FACTS] *"Once again ... forensic science using the undeniable facts of blood type, fingerprints, and spectrographic analysis of paint fragments proves beyond a doubt..."*

B. [FORM] *"At 3:30 pm, Thursday, April 9th, on route 9, 15 miles north of Columbus, a black 1978 Plymouth, four-door sedan traveling at 75 miles per hour in a 35 mph school zone..."*

C. [FEELINGS] *"Tearful, screaming mother attacks the cowering suspect as irate police officers hold off an angry mob at the terrifying scene of tangled school bus and the accident's bloody victims."*

D. [FUTURE] *"This accident demonstrates the lethal combination of drunk driving and faulty car design. These these two issues are national in scope and deserve urgent congressional attention in future generations are to be adequately protected..."*

"After all, how many people speak the same language even when they speak the same language?"
~Russell Hoban,
Writer

Figure 20. Notes of reporters with different thinking modes (Herrmann, 1996)

Herrmann (1996) argues that people with the style of 'D quadrant' are often dumped through organizations' recruitment process since they may seem to lack a logical series of work experience while Ironically they are what organizations need. Many of the entrepreneurs (with entrepreneurial mindset) are coming from the same quadrant and are quite successful in informal business setting. He (1990) sees 'street' as a type of smartness beside other types of smartness (i.e. factual, visual, procedural, intellectual, musical, artistic, emotional, organizational, social, administrative, etc.). Thus, brain dominance may cause being smart in some of those aspects, when at the same time being dull in the others. Mintzberg (1976), also had raised the question "why is it that some of us are so smart and dull at the same time; so incredibly capable of certain mental activities and so curiously incapable of others".

*"None of us is
as smart as
all of us."*
~Ken Blanchard,
Author

According to Herrmann (1996), any quadrant has its own management and working preferences. Briefly, in terms work activity, some of their tendencies are as below:

A quadrant

Working solo, applying formulas, analyzing data, making things work, clarifying issues, diagnosing, solving technical problems, figuring out budget, calculating, learning tools to enhance performance, defining goals, conducting statistical analysis, and putting time to know others...

B quadrant

Paying attention to details, getting things done on time, preserving the status/quo, stabilizing, searching, planning, being in control, building things, structuring & documenting tasks, creating list, organizing & categorizing, safekeeping, following instructions...

C quadrant

Working with people, communicating, building relationships, listening & talking, expressing ideas, teaching, counseling, feeling, personalize, expressing through writing, being aware of nonverbal communication, having fun, Being musical & dancing...

D quadrant

Taking risks, developing & selling ideas, designing, imagining, providing vision, bringing change, experiment, playing around, seeing the end

from the start, do creative makings, day dreaming, Speculating, brainstorming, conceptualizing, running forward...

In terms of management, as their tendencies are different, it may thereby cause more challenges working with people of other types:

A Manager

Focused on task at hand, rational, content working on problems rather than talking solutions, can be so analytical, may not show emotions, values facts more than intuitions, style can be authoritarian/directive...

B Manager

Strives for safety and stability, highly considering deadlines, likes order & clear line on authority, avoids risks, more focused on short-term results, values following rules, being on time, and accuracy, style can be traditional or conservative...

C Manager

Highly participative, HR is primary asset, concerned with issues affecting employees, advocating training, talking through problems, prefers face-to-face interactions, values friendly climate & open door, style can be interactive or intuitive...

*"So much of what we call management consist of making it difficult to work."
~Peter Drucker, Father of Management*

D Manager

Visionary, integrative, last minute ideas, futuristic, salesman, strategist, open & less structured, dislikes procedures if get on the way forward, creative thinking, dramatically opposed B, values innovation, and openness, style can be holistic & entrepreneurial...

Moreover, regarding learning and teaching styles (figure 21) Herrmann (1996) suggest that people oriented most toward A quadrant, learn by 'facts' and respond best to case discussions, reading textbooks, and hearing lectures. They are rational, quantitative, and theoretical. As teachers, they desire academic outcomes from their students. People oriented most toward B quadrant, learn by 'forming' and respond best to structured and controlled program, and reading textbooks and attend lectures. They are sequential, procedural, and methodical. As teachers they are task driven and seem to be traditional. About C quadrant, they learn by 'feeling' and respond best to

group interaction, act and move, and people-oriented cases. They are Emotional, expressive, and kinesthetic. As teachers, this group tends to have humanistic and group approach. People with tendency toward D quadrant learn by 'fantasy'. Then tend for self-discovery, and usually become concerned with hidden possibilities. They best respond to experiencing, visual, aesthetic learning styles. Also, they are conceptual and simultaneous. As teachers, they are found to be flexible, open, and tend to incorporate futuristic views. It is reported that effective learning takes place if all four thinking quadrants are involved in learning. Lumsdaine and Lumsdaine (1995) have described the four learning modes as: external, internal, interactive, and procedural. In external learning, it is most close to A quadrant, by tendency for authority through lectures and textbooks. Internal learning is through visualization, understanding concepts, holistically and intuitively, which would be the same as D quadrant. Interactive learning is more like sharing, group discussions, and try and fail experiments similar to C quadrant. And the last one, procedural learning is through methodical and sequential testing of what being thought, which then leads to improving skills practices the same as B quadrant. About learning design strategy can be found in Appendix D.

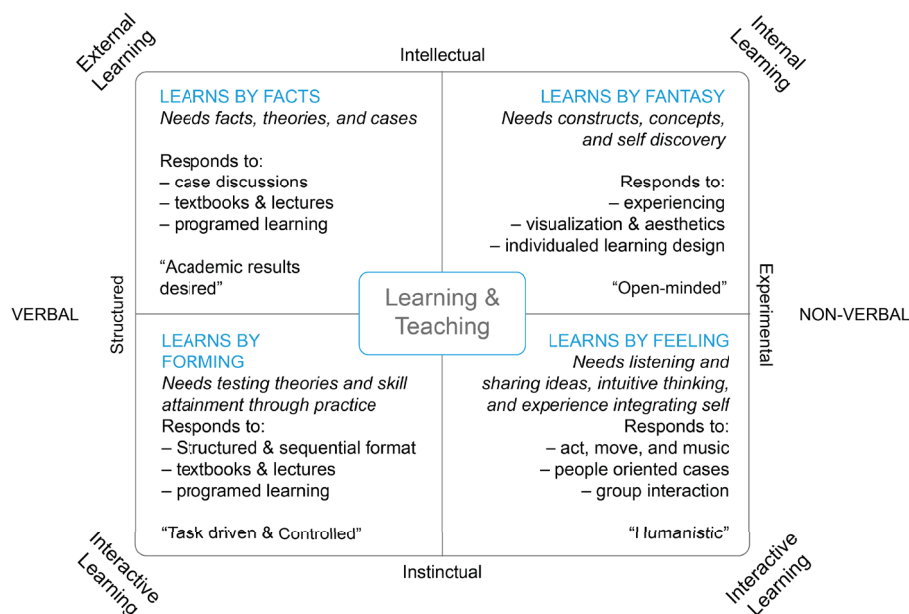


Figure 21. Learning & teaching styles (Herrmann, 1995)

In the realm of problem solving, the concept of 'creative problem solving' introduced by Herrmann (1995), is a framework that encourages Whole Brain iterative thinking in an effective manner leveraging team effort (figure 22); hence improving productivity, quality of teamwork, thinking, and communication skills of students (Lumsdaine & Lumsdaine, 1994). The creativity process includes these stages:

1. Interest

Awareness about the problem is raised –this phase is to get the process off the ground.

2. Preparation

The problem gets defined and research & analysis begin – Information is absorbed.

3. Incubation

An intuition may become validated as an insight.

4. Illumination

Generating ideas –‘AHA!’ state of project.

5. Verification

The solution becomes selected.

6. Application

This is the final stage for making the solution a reality –ensuring that ideas are implemented.

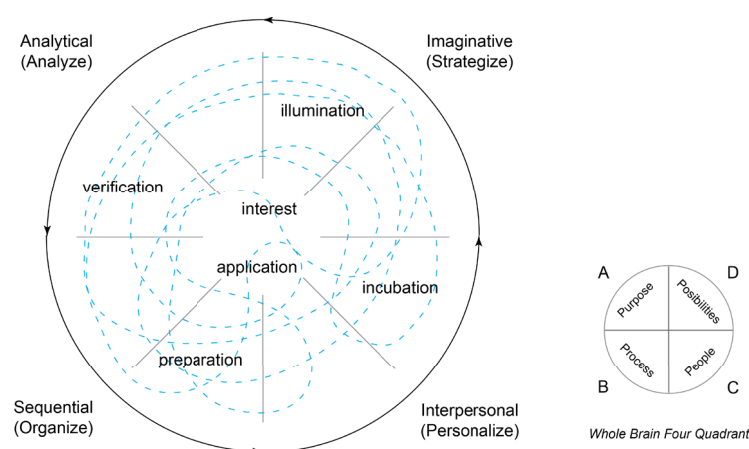


Figure 22. Whole Brain creative process, (Herrmann, 1995)

2.2.11 HUMAN DYNAMICS

In late 20th century, another framework introduced by Sandra Seagal and her colleagues (1997) called 'Human Dynamics'; a new understanding of human functioning based on an ongoing research since 1979. This research has so far involved over 300,000 people in more than thirty countries (Human Dynamics, 2013). Human Dynamics looks at fundamental structures and processes that form distinct infrastructures underlying psychologies (Seagal, 1997). According to Seagal (1997), the framework goes deeper than personality assessment techniques and focus at how people inherently process information, make decision, communicate, and learn, by exploring three universal principles (figure 23): mental, emotional (relational), and physical (practical). Combination of these will shape one's 'personality dynamic'.

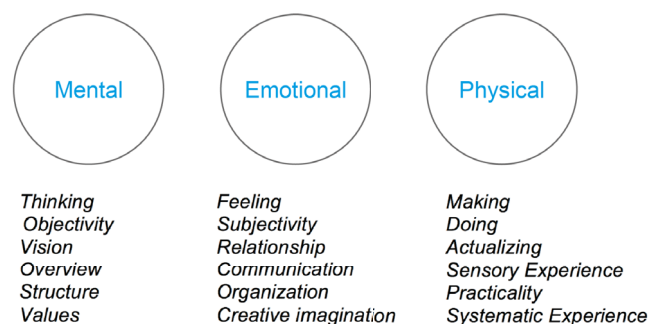


Figure 23. Universal Principles of human functioning (Seagal, 1997)

Eventually, Seagal (1997) identified nine distinct human systems; five of which were constantly evident to pre-dominating the population. Seagal proposed a method of self-discovery process (no particular test or questionnaire) and by means of sensitive listening and observation through the new awareness of the personality dynamics. This is also believed to have applications in team functioning, personal development, teaching, learning,

etc. Senge (1997) has appreciated Seagal's Human Dynamics and suggested that although all the other models could be useful, but their 'categorization system' in practice has been somewhat uneasy and remembering their meanings would have been difficult and also they may have been raising negative feeling regarding 'putting into a box'. In addition, in his opinion, Human Dynamics's fundamental strength is that the differences in dynamics are a source of richness to be appreciated "without any implicit judgment". In Human Dynamics framework, personality distinctions could be achieved through observation. General accessible cues can be people's behavior, gestures and movements (or lack of them), way of communicating and interacting with others, type of memory, preference of certain words, way of learning, etc.

"We have understood that resolving complex issues requires collaboration; we have neither recognized the need for conscious training nor had a framework for understanding human functioning."
~Sandra Seagal

Three major themes have been identified (Seagal, 1997): mentally-centered, physically-centered, and emotionally-centered. Seagal suggest that the three principles (mental, physical, and emotional) must be in balance and well integrated (figure 24). If all are developed and integrated in an individual, the result is well functioning. However, when a principle is undeveloped or not integrated, it can result in lack of wholeness and relative ineffectiveness in some areas of life. Moreover, imbalance has not been found to be uncommon (Seagal & Horne, 1997).

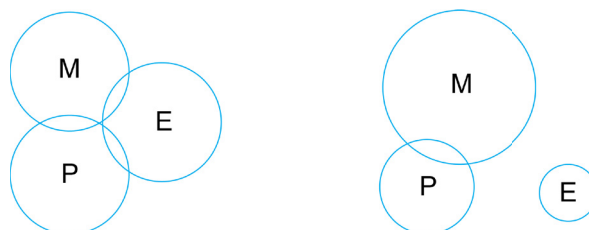


Figure 24. Integration of principles; well-integrated on the left (Seagal, 1997)

The three principles described by Seagal (1997) can be described briefly as followings:

The mental principle

- *Process information in linear, rational, and sequential way*
- *Main functions include thinking, envisioning, planning, focusing, directing, structuring, seeing the overview, establishing values, objective-oriented, conceptualizing, and analyzing*
- *Emphasizes on concepts, structures, and ideas*
- *If well-developed, leads to directing actions with detachment, perspective, clear vision, defined values, while focusing on long-term plan*
- *If relatively undeveloped, thoughts could be less clear, irrational, unfocused, and blind to principles of operation.*

The physical principle

- *Process information in a systemic way (gathering & interconnecting relevant data)*
- *Main functions include doing, producing, making solid, detailing, utilizing, ensuring, synthesizing, and systematizing*
- *Emphasizes on actions and operations*
- *If well-developed help people in pragmatic parts (making & actualizing)*
- *If relatively undeveloped, leads to poor performance of tasks, less attention to details, lack of practicality, and having difficulty in bringing ideas to fruition.*

The Emotional principle

- *Process information in lateral way (by emotional association)*
- *Main functions include feeling, connecting, communicating, relating, personalizing, empathizing, organizing, harmonizing, and imagining*
- *Emphasizes on relationships and organization*
- *If well-developed leads to knowing and valuing the world of feelings, offers communication and how to collaborate & organize, becoming flexible, creative, aware of self-feelings without being dominated by*

them and express them appropriately, and able to find harmony between having diversity and having focus

- *If relatively undeveloped, would be less aware of self-feelings and poor expressiveness, and may react just emotionally rather than appropriately*

Based on above, in Human Dynamics model, an individual is having one of the (three) principles as his or her centered principle and will find another principle as a secondary tendency. As a result, the centered principle would determine one's way of processing information (linearly, systematically, or laterally) and then the second linking principle relates to the type of information being processed (Seagal & Horne, 1997). As a result, existence of nine different forms of personality dynamics would be possible (figure 25). However, Seagal (1997) suggested that through their researches, there were only five of these personality dynamics that constitute almost the whole research's population (see figure 26). And among them, Emotional-Physical was found to be occupying higher margin than the rest of the crowd.

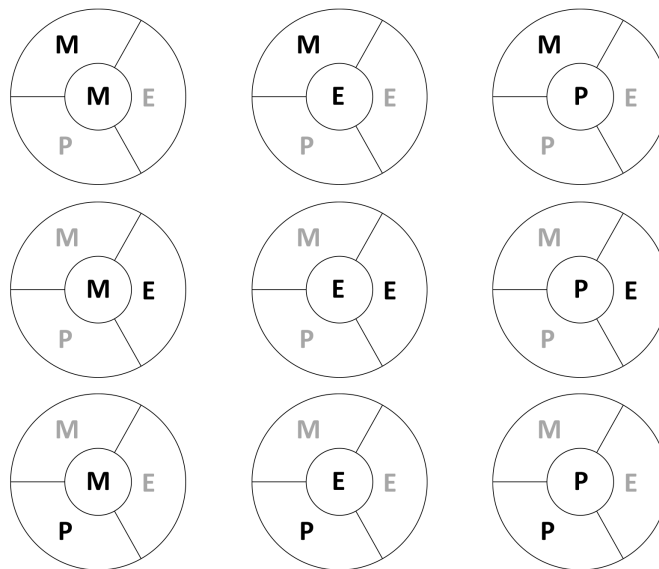


Figure 25. Nine personality dynamics (Seagal & Horne, 1997)

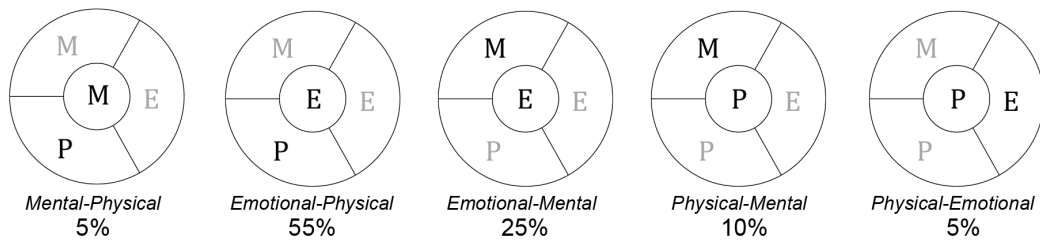


Figure 26. Five pre-dominant personality dynamics (Seagal & Horne, 1997)

A brief portrait for each of these five personality dynamics is mentioned in the following part. It has to be noted that about personality dynamics Seagal (1997) has suggested that they have seen to be matured over time, but were not shifted to become any other personality dynamic. Regarding the environmental influences (figure 27), its circumstances do not determine the personality dynamics, but can play a role in its development –“supporting or hindering individual’s particular system of functioning”. Hence, it proposes that the personality dynamic itself is determined genetically more than through experiences, culture, career, and so forth, which can modify one’s behavior to some extent, but will not alternate his or her fundamental and inherent way of functioning (Seagal & Horne, 1997).

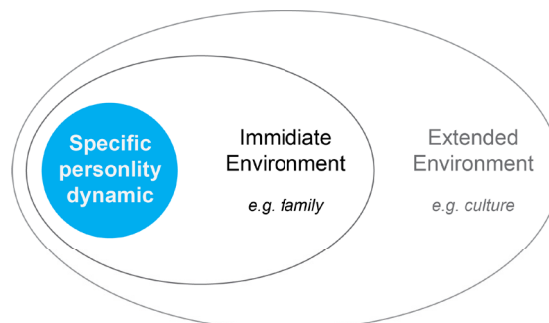


Figure 27. Environmental influence on personality (Seagal, 1997)

1) Mental-Physical

General: *Objective, focused, reliable, precise, consistent, independent*

Learning: *Linear, visual, solitary, interactive with subject, selective*

Management: *directive, maintains overall direction, may be unaware of the effect of decisions & timing upon others, needs help with people issues, communication, and flexibility*

Values: *objectivity, clarity & vision, long-range perspective, quality, logical thinking, precision*

Function: *articulates values, vision, and principles, maintains overview, ensures long-range planning, sets structures & standards, formulates objective communication, determines common ground & values*

Relationship: *reliable, consistent, rarely expressing feelings, feelings are subordinate to tasks, may need help connecting with others*

Stress: *by insufficient time alone, too many tasks at once, and time for implementation, and conflict with personal values*

Body: *upright, restrained, not easily overwhelmed by emotions, steady rhythm while doing things, eyes are focused & objective, hands are used with restraint and to make points*

Communication: *Purposeful, objective, and rationally connected, clarity & precision is highly valued, can be meticulous in selecting words, comfortable with silence, more factual, conceptual, and informational when speaking, and may be perceived mistakenly aloof & uncaring, words being frequently used are such as: logical, focus, plan, perspective, visual, example, precise, principle, decision, thinking, assessment, information, point, definition, why, purpose, ...*

Developmental direction: *a deep purpose can be bringing unity to a divided world*

Example:

*"Is there a way of living that is noble, in what does it consist
and how shall we achieve it?"*

*~Bertrand Russell,
philosopher, mathematician, & social critic*

2) Emotional-Mental (Emotional-Objective)

General: *animated, individualistic, communicative, intense, creative (with ideas & creating models, enthusiastic*

Learning: *lateral, dialogue, interactions, idea exchanging, open-ended problem solving, and experimentation*

Management: *participative, collaborative, communicative, involved in many parts, may have difficulty delegating, fast decision-making*

Values: *innovation, challenge, and risk forward movement, structure & timelines, significant communication, and collective effort*

Function: *creates new ideas, works forward, communicates, sees emergent possibilities, and motivates*

Relationships: *relational, verbally expressive, not much aware of feelings of people around, relatively objective, and focused on ideas*

Stress: *by lack of physical needs, slow progress, and routine tasks*

Body: *relative variety of postures, able to work long hours without conscious fatigue, eyes are intensive, penetrating, focused, and outward, and hands show many gestures*

Communication: *willing to process ideas with others, brainstorm, purposeful discussion through a big picture rather than details, and words being frequently used are such as: new, idea, innovation, try, emergent, begin, possibilities, change, challenge, risk, interact independence, enthusiasm, structure, rules, fair, respect, let's go!, ...*

Developmental direction: *a deep purpose is to create creative methods for serving humanity & tries to empower others, respecting group effort*

Example:

*"Time is deaf to every plea and rushes on. Over the
bleached bones and jumbled residues of numerous civilizations,
are written the pathetic words: Too late!"*

*~Martin Luther King,
civil rights activist & movement leader*

3) Emotional-Physical (Emotional-Subjective)

General: *animated, communicative, empathic, creative & artistic, making personal connections, expressive, and sensitive*

Learning: *auditory, lateral, incorporated dialogue, group work, takes in information that has personal significance*

Management: *participative, collaborative, communicative, involved in diverse activities, may not delegate enough*

Values: *diversity, harmony, significant communication, connection with people, organization (group work), expressing feelings, and creativity*

Function: connects & communicate personally, organize, makes new forms, links many parts, and addresses people's issues

Stress: by lack of opportunity to express feelings, impersonal or threatening environment, lack of personal connection, involvement in too many activities, exposure to too many stimuli, need for careful selection of people & environment to connect, and need for physical exercise and time being alone

Body: variety of postures, flexible, variety of facial expressions, body talks, tends to hold emotional trauma, experiencing wide range of energy, eyes are expressive, mobile, moving between inner & outer focus, and personally connecting, hands display many gestures, and used to express or dramatize personal feelings

Communication: it is a joy, tends to facilitate & express personal connection, may touch at the same time, gesture & facial expressions, can be difficult to formulate an idea or a feeling, often need for a listener with patience, finds focus, clarity, and gets rid of tension by talking (usually do not want solution to be offered, unless they ask for it), regular concerns that something vital has denied them, and words being frequently used are such as: feeling, artistic, personally, comfortable, relationship, liking, how, gut, understand, need, inner harmony, sensitive, empathy, sympathy, subtle, love, sense, remember, great!, wow!, I, my, you, your, sad, happy, beautiful, ...

Developmental direction: a deep purpose is to understand & support humans

Example:

*"Small things with great love. It is not how much we do,
but how much love we put in the doing. It is not how much we give
but how much love we put in the giving"
~Mother Teresa,
saint & religious sister*

4) Physical-Emotional

General: still, grounded, calm, enduring, adaptive, receptive, practical

Learning: systemic, interactive with tasks, detailed data, internal processing, hand-on experience (kinesthetic), absorption over time

Management: delegates tasks easily, sharing parts within the whole, spend considerable time to process much information, and may need help with personalized communication and people's issues

Values: practicality, turning ideas into reality, detailed planning, producing, reliable (fact-based) communication, cooperation, nature, continuity, interest in how things work, and systematic problem-solving

Function: *translates plans into practical reality, checks practicality, links present with past & future, undertakes detailed work, brings stability, and takes the whole systems into account*

Relationships: *serves needs of others, accepting, calm, reliable, and may need help in expressing feelings*

Stress: *insufficient factual data, overload of accumulated data & memories, lack of time to process, insufficient time alone (specially in nature), and lack of clear parameters & directives for tasks*

Body: *relatively still, small & slow movement, relaxed & grounded posture, eyes are regarding and with diffused focus, hands are gentle, slow, with soft gestures, and often used to describe functions*

Communication: *often unaware of 'personal processing', tends to talk about what he/she is doing, prefers to do rather than discuss, it is a challenge to establish own identity, and words being frequently used are such as: time, complete, concrete, context, action plan, experience, continuity, accuracy, history, literal, practical, specific, organic, whole, delegate, real, do, details, facts, data, method, reliable, silence, we, ...*

Developmental direction: *a deep purpose is to create unity out of diversity*

Example:

"Always fall in what you're asked to accept, take what is given, and make it over your way. My aim in life has always been to hold my own with whatever's going. Not against: With!"

~Robert Frost, poet

*"Effective dialogue depends not only on paying attention to one another's words, but also on taking into account who is saying them."
~Sandra Seagal*

5) Physical-Mental

(a type in between Physical-Emotional and Mental-Physical)

General: *still, grounded, calm, enduring, adaptable, objective, receptive, practical, and efficient*

Learning: *systemic, interactive with tasks, taking considerable details, internal processing, kinesthetic*

Management: *delegates tasks after initial plans structured, needs time to reach decisions, needs help to personalize communication & deal with people's issues*

Values: *systemic thinking, interest in how things work, practicality, idea translation into actuality, efficiency, concreteness, factual discussion, task orientation, cooperation, continuity, nature, and the natural world*

Function: *long-term planning, methodical, creates detailed models, comprehensive planning, translates plans into actuality, ensures practicality, links past, present, and future patterns, considers the whole system, solves implementation problems*

Relationships: *serves other's needs, accepting, calm, reliable, objective, communication is largely related to practicalities, and may need help in expressing feelings and connecting personally*

Stress: *by accumulation of data & memories in the body, insufficient time to process data & response, insufficient time alone, unremitting immersion in fast mental rhythm, emotion-laden communication*

Body: *relatively still, small movement, posture conveys a sense of relaxation & grounded-ness, little change in facial expression, fast rhythm in the head, slower & deeper rhythm in the body, need for exercise, relaxation, and time alone to rebalance, eyes are regarding, hands are gentle, soft movement, and often used to describe a function*

Communication: *needs to establish purpose of discussion at the very beginning, required amount of data depends on the importance, thinking & remembering in terms of key points, may prefer written communication for reliability & precision, and words being frequently used are very similar to Physical-Emotional people but more around: facts, practicality, purpose, concreteness, and next actions...*

Developmental direction: *one is to maintain qualitative relationship*

Example:

"Future generations are likely to condone our lack of prudent concern for the integrity of the natural world that supports all life.

This an area of specialists, each of whom sees his own problem and is unaware of the larger frame into which it fits."

~Rachel Carson,

biologist & writer on environmental movement

Regarding communication, Seagal (1997) suggests that each personality dynamic has its own style (communication rhythm). For example, Mental-Physical people show tendency for abstract discussions while appreciate clarity and precision. Hence they prefer to define the terms, and the pace of speech would be affected with periods of silence for internal processing, while it is dramatically different from Emotional-Physical people,

who tend to follow up an interpersonal process (empathically) and always maintain the connection with the other participants. Some key differences in communication style have been observed in regards to the pace, orientations toward details, feeling, or facts, being linear, multidirectional, or methodical, etc. (Seagal & Horne, 1997). Thus, it can be easy to misinterpret others and experience frustration if lacking an understanding of each style's needs and process. Nevertheless, it seems that these communication rhythms (figure 29) are following similar patterns from the same group's thinking style and activity rhythm (figure 28). It could be impossible or difficult to change one's rhythm, but would be easier to learn it. It is important to know that each dynamic emphasizes on certain acts in its activity rhythm (Seagal & Horne 1997); Mental-Physical on long-term thinking, double checking and finance, and sometimes even referring to 'why', Emotional-Physical highly engages with actual actions, gathering information is mainly around ideas and then developments come afterwards, Emotional-Physical on environment related to people, joy, feelings, connection with the others, and may sound non-linear, Physical-Emotional on sufficient data and lots of information, and Physical-Mental something in between Mental-Physical and Physical-Emotional, but planning and clarity of the tasks are critical. These qualities can help us in identifying their dynamics based on their activity rhythm.

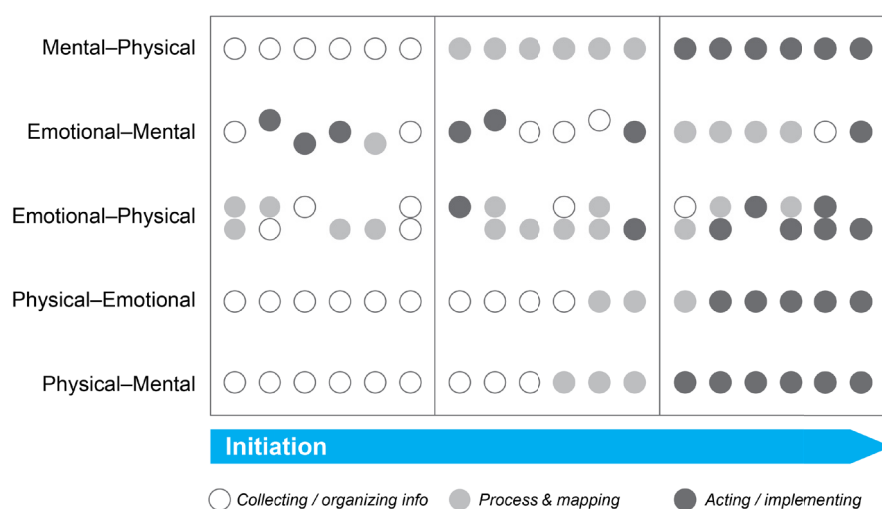


Figure 28. Activity rhythms of personality dynamics (Seagal & Horne, 1997)

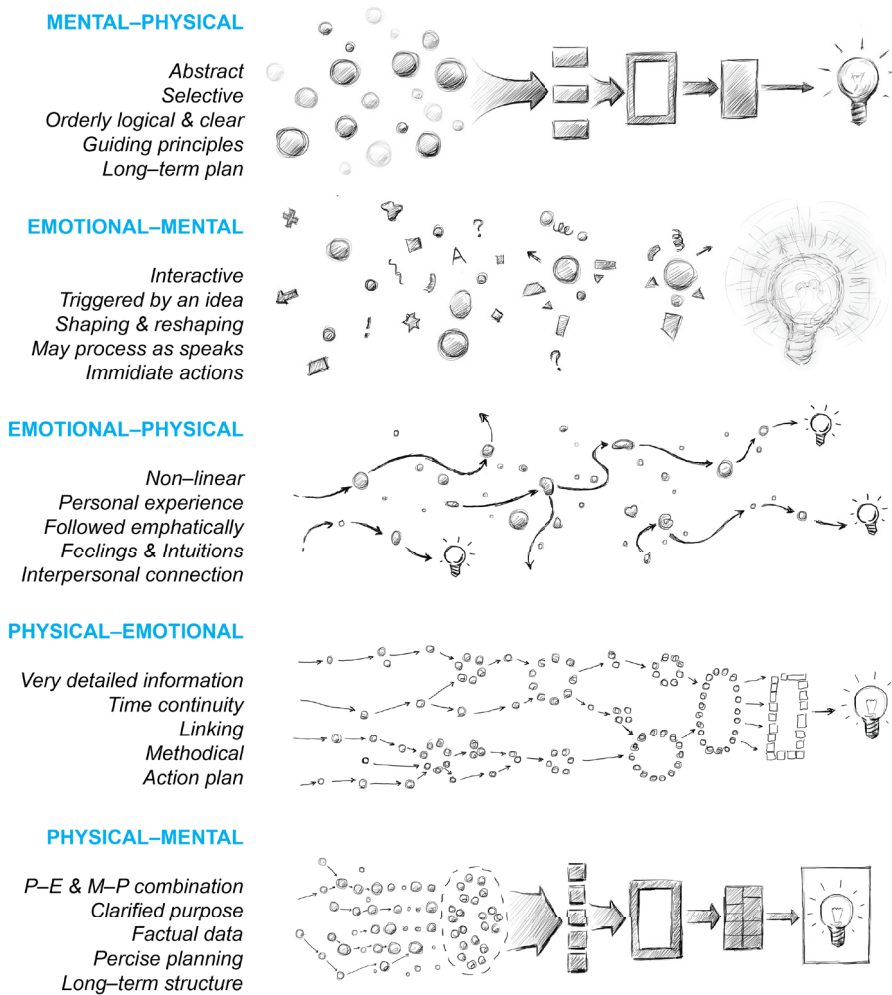


Figure 29. Communication rhythm & preferred progress pattern;
modified version of original figure from Seagal & Horne (1997)

*"Communication
is a dance
and I want
someone to
dance with me."
~Anonymous*

It has been suggested that learning about Human Dynamics has been affective in enhancing learning capabilities and furthermore, being supportive and in line with the prescribed features of the 'learning organization' (e.g. Gauthier, 1994; Karash, 1995), it has improved organization's performance in a positive manner according to the studies found in this research (e.g. Glosso, 2002). This informs that this model also could be beneficial to be used by educators in school.

2.3 MENTAL PREFERENCES MODEL

Mental Preferences Model (MPM) is a visual tool proposed by current research project (see figure 30). It has been created to help individuals in their distinction process of one's thinking preferences. It can improve the process by providing several key factors related to thinking style & preferred way of doing things. By identifying any of those factors, one could spot its area in the model. Any area in the model would reflect certain meanings according to the factors related to that area (see the examples throughout this thesis book). The more factors identified, the easier and more reliable it can be with the judgments. There are sixteen connotative factors in the model, which are sitting two by two in front of each other, holding the most contrast with each other (see figure 31). Hence, it consists of eight bipolar scales. Therefore, there are only eight scales that need to be remembered. It is highly important to consider that this model is not a measurement tool, but it is created to visualize meanings or be a rendering guide for obtaining meanings.

"Visualizing something organizes one's ability to accomplish it."
~Stephen Covey, educator & author

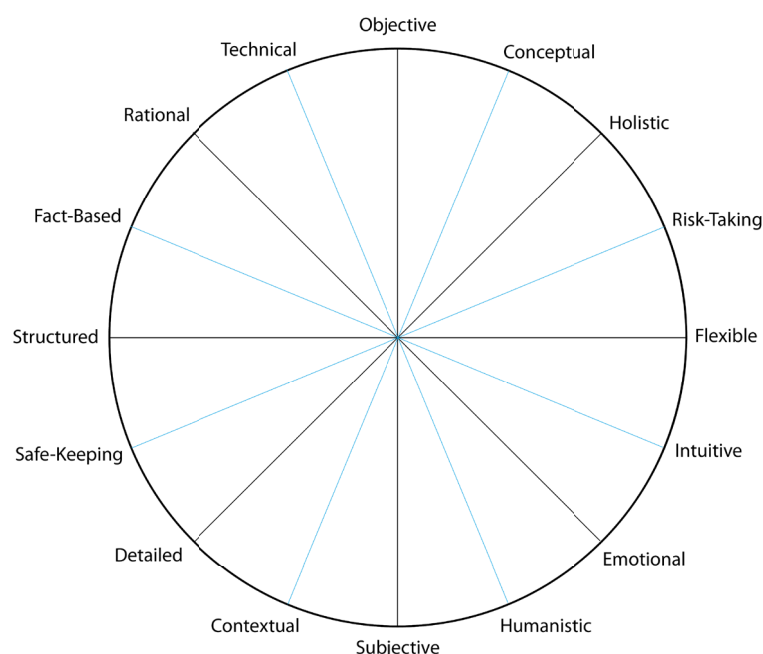


Figure 30. Mental Preferences Model

As Senge (1997) has noted: “The real problems start in our own minds... recognizing differences requires making distinctions... most distinctions we invoke regarding people are based on inherited assumptions and unexamined stereotypes”. He also refers to the stereotypes such as: gender, culture, or profession and argues that these distinctions then become the bases for (automatic) judgments and further on, they may reinforce those stereotypes. MPM is a result of an effort mainly aimed at providing guidance for better distinctions in particular to inherent preferences of individuals and groups. Hence, this thesis will conduct research on validity and functionality of this model.

In order to use the model in teaching and for raising awareness, either styles of Whole Brain model or Seagal’s personality dynamics can be given as examples reflecting of those key factors (in place in the model’s frame).



Figure 31. MPM Scales, 2012

2.3.1 DEVELOPMENT PROCESS

Even though with being to some extent familiar with Myers Briggs (sixteen) personality types, this research was first inspired by the Whole Brain model (1996), since that model put the concept of thinking mood at the core of our personality and The model was simple and easy to understand; four quadrants of thinking that create the whole. However, Whole Brain model the same as many other models, creates the tendency of 'putting people in a box', which has been Senge's (1997) concern, as well. Moreover, it works with a measurement tool, which seems to be more a top-down tool (i.e. assisting managers) rather than bottom-up tool (helping end users, students, employees). Consequently, second inspiration came up by studying Human Dynamics of Seagal (1997); no boxes (in traditional sense) and also provided insights based on a deferent kind of approach toward understanding human functioning. Since its utilization is proposed to be upon sensitive listening and observations (Seagal, 1997) therefore it has not provide any main tool or elegant systematic method for indication.

The study found so much in common between the two inspirational models at their core and obviously, not at a-surface-level since they both have their own way of categorization and framing. In fact, that would not be surprising as they both are talking about the same beings' thinking diversity. Therefore, the idea of mapping their similarities emerged for this research project. As noted earlier, MPM was built on Whole Brain model & Human Dynamics at its base. In fact, initially, the two models were put over each other for finding match points and possible consistencies.

For that cause, Herrmann's (1995) model was used as a base because of providing a visual framework. At the same time, it was carried with the qualities from each of four quadrants. All of the qualities were listed and classified in their positions within the four portions of the frame (i.e. regarding upper-left, lower-right, etc.). Then, in the same manner, another frame (as shown in figure 32) was created and divided to five (with fuzzy borders), in

order to host five personality dynamics (of Human Dynamics) and was placed over the previous frame (imagine two transparent layers). Finally, most of the items on the upper layer were moved a bit to find a better position that would be most close to similar or related items mentioned in the lower layer; aiming to bring match with the qualities of each of four quadrants, while at the same time, would hold a proper position regarding its personality dynamics area*.

Next, the same process was repeated few times for updating each layer so that items eventually found positions in proper match according to any of the frames (Whole Brain & Human Dynamics). This successfully resulted in having a new frame, combining the two models, what was remained at the end of this stage was to remove duplicated items. Interestingly, there was not any quality from one of the frames that would be found in a 'wrong' place according to the other frame. However, there were some items like organizer for instance, but their descriptive explanation could reveal that in one model it is referred to organizing related to objects with aesthetic sense or related to people, while in the other it was in regards to tasks, information, organization of documents. In similar way, such differences between similar items were acknowledged by this study and received attention.

* Items of each personality dynamic hold least distance to each other in compare to the items of another dynamic. As a result, each group would visibly hold a particular area within the frame.

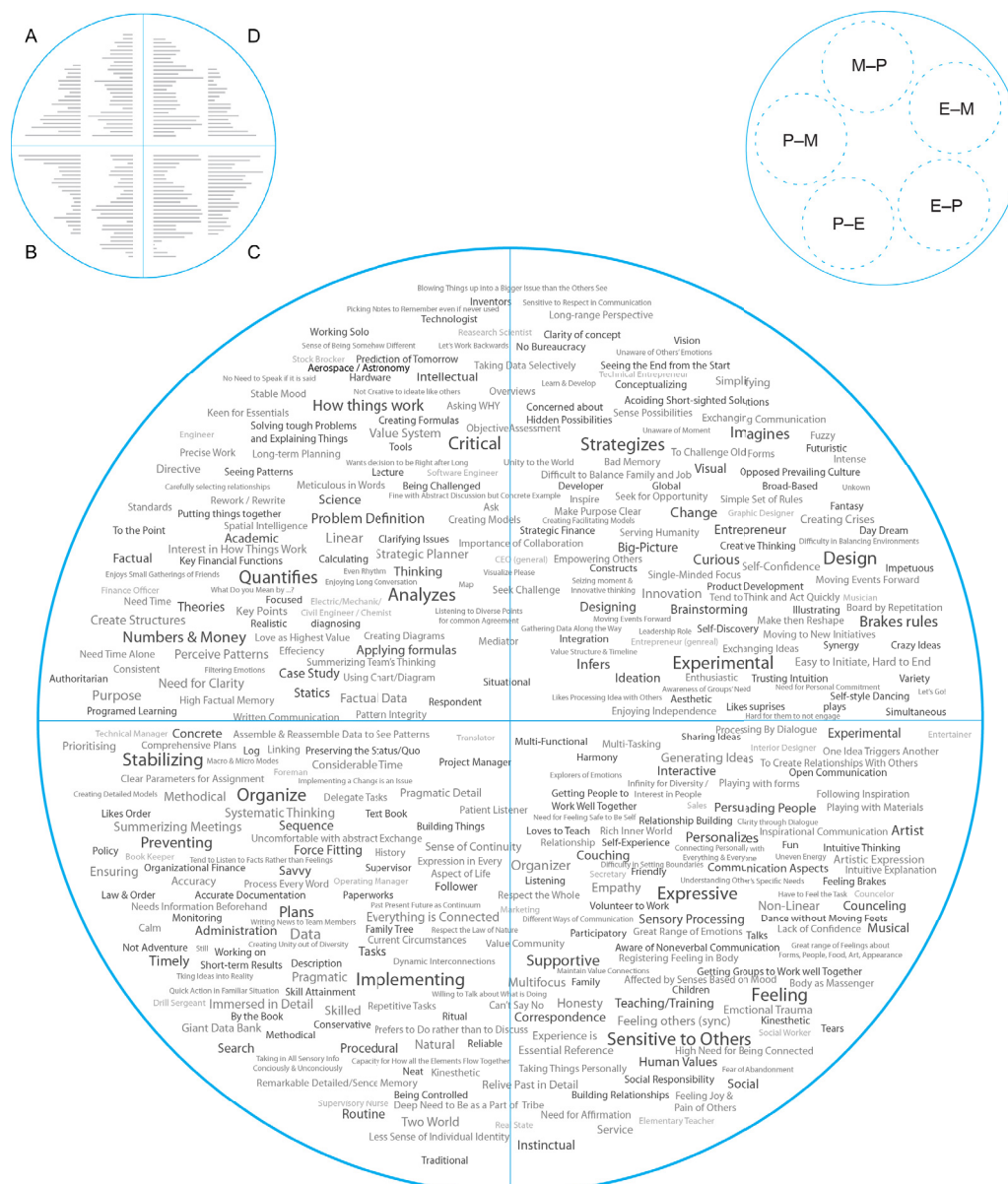


Figure 32. A step in the process of creating Mental Preferences Model, 2011

According to what was noted earlier, the more we look in the frame toward up and a bit to the left, qualities of Mental-Physical people will emerge, which would be compatible with most features of quadrant A (upper-left) and few features of quadrant D (upper-right) and therefore in harmony with the other model. Sequentially, it will be found that qualities of each personality dynamic are in harmony with the features expected in place from Whole Brain model:

- The more toward right on upper half, would be qualities of Emotional-Mental people matching quadrant D
- The more toward right but on the lower half, would be qualities of Emotional-Physical people matching quadrant C
- The more toward down left, exist the qualities of Physical-Emotional people similar to quadrant B
- And at last the same as what Seagal suggested (1997), Physical-Mental people have more in common with Physical-Emotional people including some features of Mental-Physical people, which would be a personality dynamic between those two. Hence, the place of their qualities on the new model should be found on the left side. The same way, their qualities can be found as more toward left.

In addition, at some point Herrmann (1996) has also pointed at a minority who have been showing situational styles i.e. in management they have been found as:

- Multi-dominant manager
- Able to apply features of all quadrants
- Drawing style as required in a situation / can cause hesitation
- Mostly found to be holding multi-functional positions (i.e. project manager, plant manager)

These people have been found to constitute only about 2.5% of the whole studied population. Anyhow, on the new model the place of their tendencies would be expected around the middle part and not much toward any particular side. This also found in proper to the final results (section 4.2).

In the second phase, an effort took place to find and draw out some key elements from the features collected and already placed in the circle. As though, it was tried to find the elements that would be in front of another element —being in most contrast— so that two by two they could shape a bipolar scale. This was because in the new frame, the relation of elements was so that on any side they are typically with tendencies to be opposing the ones on the other side. As a result, the elements were slightly updated, this

time to find sensible distance to meet the right position for extremes of the end points of bipolar scales. Eventually, eight scales (sixteen factors) were emerged and identified. Four of which are primary and four supportive.

Initially (as displayed via figure 33), the horizontal and vertical scales were placed forming the main base. Vertical scale had to be objective-subjective as emphasized by Herrmann (1996) saying upper brain is showing more objectivity while lower brain shows more subjectivity and in fact that seems in line with Seagal's framework as a key difference between Emotional-Mental people and Emotional-Physical people is about being more objective or subjective (E-M was called Emotional-objective and E-P was called Emotional-subjective). Herrmann (1996) also suggested that the functions of styles on the left come with structure, while for the right styles higher flexibility appears. Likewise, the horizontal scale is set to be structure-flexible. In the same fashion two other scales were added (as second main cross, connecting upper-left to lower-right and lower-left to upper right). Being in harmony with the chosen positions of personality dynamics, Herrmann (1996) considered upper-left (A) quadrant displaying higher rational tendencies, while the lower-right (C) quadrant showing emotional tendencies in highest contrast. Also, the lower-left (B) quadrant displays tendency for detailed information, detailed work and planning, and details in general, while the upper-right finds it easier with holistic, abstract, and even fuzzy ideas at first hand and may prefer to leave the detailed work to the others. Thus, this second cross became as rational-emotional and detailed-holistic scales. These scales (two crosses: eight scales) become the primary scales. Then, in the same manner, there are eight more supporting scales that can act as guidance for better indication. These scales are: 'risk-taking'-safekeeping, 'fact-based'-intuitive, technical-humanistic, and conceptual-contextual.

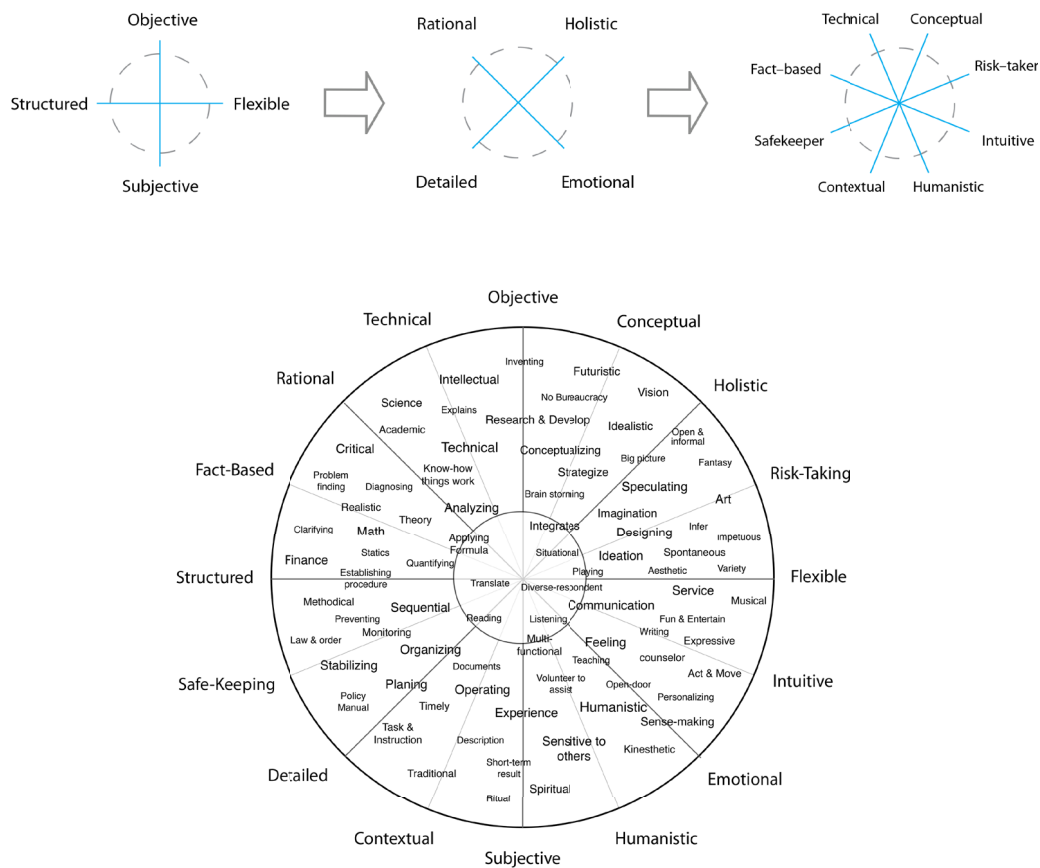


Figure 33. Intersections of Mental Preferences Model, 2011

During the very early stages of development of MPM, (by means of quick prototyping) some individuals were asked to fill a short questionnaire (appendix F) giving a weight to each polar for example by contributing the amount of 10 between the two factors on each scale based on their typical tendency toward each manner i.e. during working on a project. Therefore, the result of those quick tests was visualized like shown in figure 34. However, later it shifted to a simpler way, which is marking an area on each scale that would best present the user's tendency toward a factor in compare to the other. As a result, placing eight dots by thinking about preferred sides could be all that is needed (e.g. figure 35; more samples in appendix G).

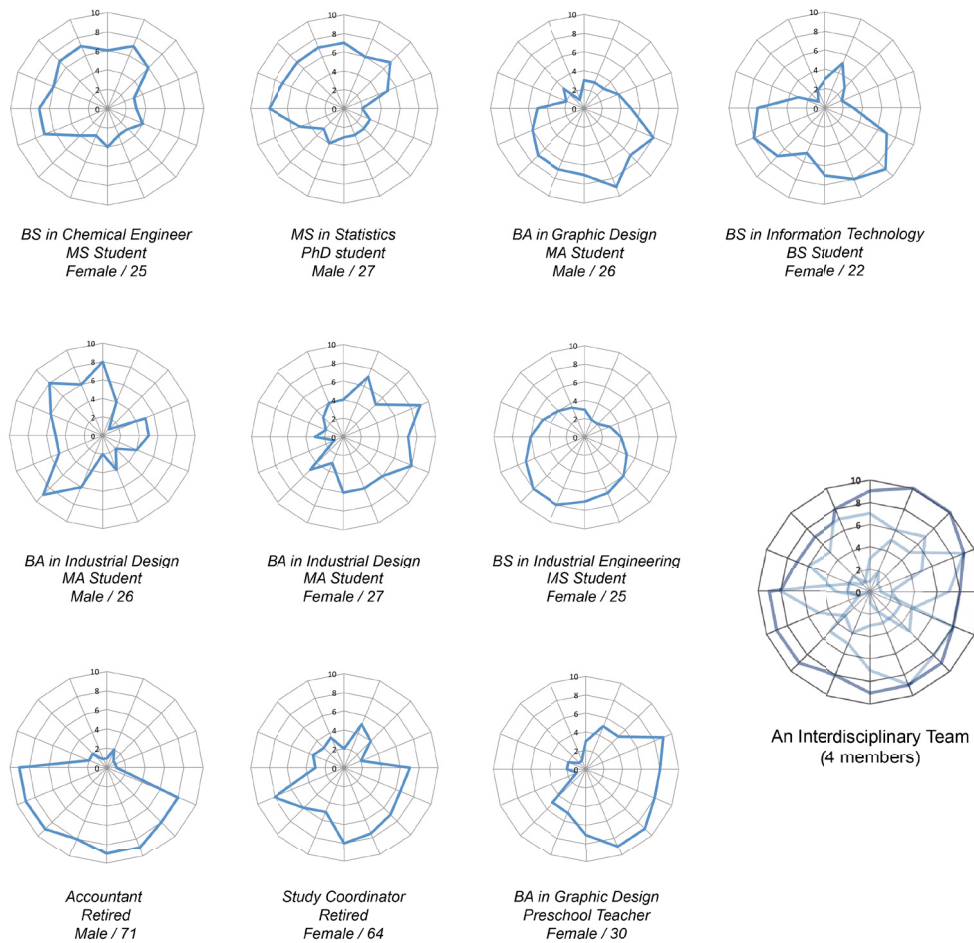


Figure 34. MPM during early prototypes, 2011

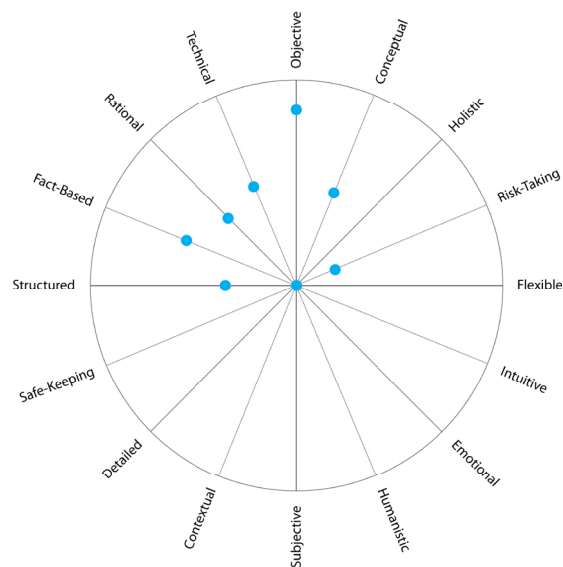


Figure 35. MPM sample profile, 2012

Moreover, by looking at the profile (figure) above, it could be expected that the user (who has put the dots according to his preferences) would be showing the same qualities as noted for Mental-Physical personality dynamic by Seagal (1997) and also, primary tendency toward upper-left (quadrant A) style and secondary tendency toward upper-right (quadrant D) in Whole Brain model. However, this is not the only given information, but in addition, the person seems to be showing very high tendency toward being objective rather than subjective. Based on Herrmann's (1996) theory, for people around him, that would be much noticeable. In the same manner, a second person in interaction with this individual can identify that he has tendencies for facts, being rational, and be more technical person, therefore emotions and intuitions are not preferred as much as they particularly in serious behavior i.e. making decision at work.

In line with what Seagal (1997) has called as sensitive listening and observations, for example in communication, a second person can focus on providing facts and consider that it would be much easier for this particular person if what is being said, sound linear and logical rather than just sharing ideas based on gut feelings. It can be also learned that the person does not necessarily show much tendency for holistic view or detailed information over each other and (i.e. in work) he can be completely situational on that aspect. Though, by learning this model users can apply it in different situations to identify the key preferred factors (mental preferences) in people he or she encounters. User may also use the model to find the dominant thinking style of a group by finding their key tendencies. Must be noted that 'extremes' are always in most importance in interaction because as Herrmann (1996) suggested, others not only can quickly notice that high tendency but also demanding the opposite quality of that extreme by them, can lead to frustration, dissatisfaction, stress, or lower performance of the person.

Last but not the least, the notion that any of these tendencies is better than another or a person with a certain tendencies is somehow lower than another, would be absolutely wrong and people should respect each other's mental preferences and remember that in this world, naturally everybody has

strengths and weaknesses for different situations, one cannot cover the whole (MPM), and therefore we need the 'whole brain'.

2.3.2 CHARACTERISTICS OF MPM

As noted earlier, development of MPM is through an ongoing research project, whereas many of features, strength, weaknesses, or qualities of the model might not yet be, discovered, tested, nor approved. However, this thesis has been examining fundamental hypothesizes required for continuation of this research project, which will be explained in the following chapters of this report. In spite of examinations, these are some features currently expected from or claimed for MPM:

*"Nothing is original.
Our most celebrated creators borrow, steal, & transform. Everything is a remix"
~Kirby
Ferguson,
filmmaker & writer*

- **Visualizing tool**

MPM can visualize an individual's or a group's (overall) mental preferences; however, not in measurement terms, but its visual element is to make meaning (see appendix G for examples). The meaning will be perceived from the set of factors in the model that the subject shows most tendencies toward them —fundamentally showing which area in the model a person's or a group's tendencies are more into. The visual profile is named as Mental Preferences Profile (MPP). There is much of information in each complete MPP that can be learned. However, accuracy about that information, which also deals with individual's perceptions, is questionable.

- **Unlimited styles**

MPM promotes possibility of unimaginable number of styles.

- **Second-hand knowledge**

MPM has been developed as described in earlier section, based on two other theories (Herrmann's Whole Brain theory & Seagal's

Human Dynamics framework), consequently, it means that MPM's development has not been in similar way as those other models have been developed. Creation of those models has been the result of long-term research effort studying directly vast numbers of individuals to understand how they function and think differently. Whereas, MPM has simply collected information from those findings, merged them, and designed a tool aiming at helping users to practically identify differences in an elegant way. However, one perspective suggests that, this provides opportunity to elicit knowledge from other models and integrate or use them in or through MPM, although it requires further research to be explicitly argued.

- **Stands as an independent model**

Although MPM has been developed based on two other models, but its function can be independent from them. This also means that criticisms regarding any of those models (that have been used as the base), do not necessarily affect MPM. For example, criticisms (e.g. by Hines, 1987) about Whole Brain regarding the claims about left-brain or right-brain, do not affect MPM, since MPM reflects tendencies toward certain factors, regardless to the structure of functions in brain.

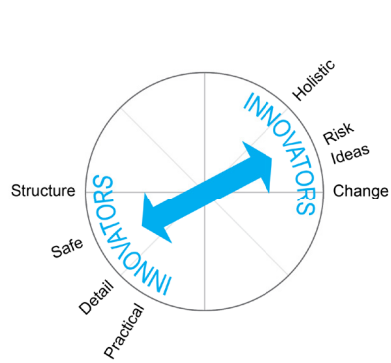
- **Supporting bottom-up approach**

It has been for long on debate that strategies for change should be addressed top-down or bottom-up. However, in the context of leadership, learning, and change management, it has been suggested that bottom-up approach is at least needed beside top-down approach, if not better than that (e.g. Marion & Uhl-Bien, 2001; Fullah, 1994; Senge, 1990). Bottom-up approaches seek to involve those affected in the process of change (by learning and interaction) and implies proactive input of them, while top-down approaches literally means that the directions and guidelines (dos and don'ts) come from the top (Senge 1990). They can also be seen as a mindset and style of teaching. MPM supports the bottom-up approach by empowering the end user to later on, independently be able to acquire information and

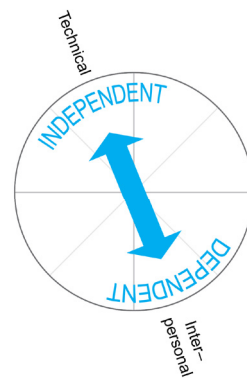
decide about his or her course of actions. This is something that most of the other models (at least in the market) seem to be lacking. It seems from most of them (i.e. their official websites) that they are created to be utilizing by managers, experts, and similar specific type of groups, who would then use what they have learned to deal with others. MPM can be at the same time used independently by both managers and subordinates for the cause to have better interactions.

- **Correlation with other models**

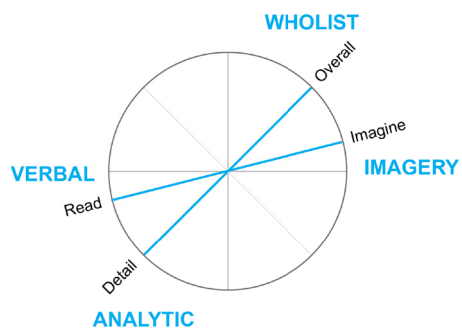
MPM has been initially built on Whole Brain model and Human Dynamics theories. However, that does not suppress and limit its possible correlation with the other models. In fact, it seems to have common ground (such as) with: functions dichotomies in Myers-Briggs, TMS working preferences, field dependence model, adaptors/innovators theory, cognitive styles of CSA, etc. (see figure 36). However, MPM lacks any indication for extraversion trait, which means that any of the recorded MPPs despite its coded data, could be from extroverts or introverts. This also can suggest that although extraversion has been found to be playing an important role in behavior (McCrae & Costa, 1997) or way of functioning (Jung, 1923), but yet when it comes to the tendencies for thinking or decision-making, rather than actual behaving, both groups may show a similar pattern. In translation for MPM's context, being extroverted or introverted seems (yet unexamined) to be having no direct effect on the responses to MPM's scales or identification of factors. Also as it was proposed by Myers-Briggs (subsection 2.2.1), extraversion/introversion is type of attitude not one of functions. Thus, it is more like behaving preference rather than thinking preference. After all, examples from other models related to thinking styles, seem possible to be incorporated with MPM i.e. in a training session, if needed. Being so, it is possible to use a mixture of information from those models and deliver them through MPM e.g. in a learning session. For example, problem-solving styles can be given based on Whole Brain, communication rhythm based on Human Dynamics, processing mode of information from CSA, etc.



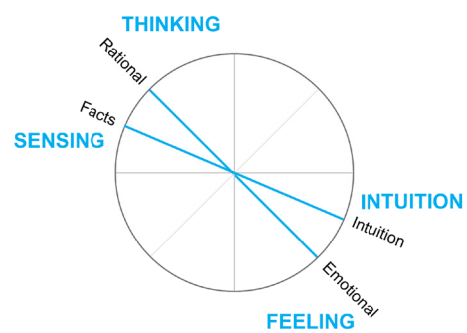
MPM & Addaption-Innovation theory



MPM & Field Independence



MPM & Cognitive Style Analysis



MPM & Functions dichotomies of Myers-Briggs

Figure 36. Correlation of MPM with other models

3. METHODS

This chapter is presenting the research approaches and methodologies for acquiring empirical evidences answering the key objectives determined for this thesis. Accordingly, the process of empirical data collections and their analysis will be described.

3.1 DESIGN AND PROCEDURES

This phase of thesis includes three study methods for data collection each in response to a specific research objective. In total, sources of evidence for this thesis were such as interviews, (sound-records), documentations (MPM profiles with filled sample-project forms), and observations (video-taped experiment) (Patton, 2002). The three choices of methods are explained in detail, each within its section in the sections below. All these methods are part of a larger ongoing research project about Mental Preferences Model. Nonetheless, the quality of the following studies can easily be questioned due to the role of the researcher (high-level) in conducting the research and experiments. Therefore, the risk of distortion of results with particular behaviors is acknowledged. However, during these studies some efforts and measures have been applied in order to prevent possible distortions.

3.2 INTERVIEW

Interviews were conducted with educators to meet the first research objective of this thesis: exploring the educators' needs in terms of improving learning of their students about thinking diversity. This qualitative method was chosen, since it was intended to explore the subjects' opinions and knowledge (Silverman, 2005; Patton, 2002). Seven interviews were conducted, six of

which were selected. One of seven subjects was from outside of university and was found to be irrelevant to the purpose of interviews. The other six subjects were among educators in Aalto University. They were selected by having interdisciplinary courses. The reason for this was to look at the areas where seems to be benefiting more from diversity and students would more likely be in need to learn about diversity and use it. In addition, the interviewees were more accessible to this research and could provide more information in case of need. The six interviewees were those who responded the calls, accepting to participate and since the result of interviews found consistency and the study was receiving the same relevant data (data saturation), the number of interviews was accepted to be enough for that stage (Given, 2008).

The interviews were conducted through scheduled meetings, each about twenty to forty minutes, in English language, and during working hours. They occurred in a private space and commonly in interviewee's own office, which also could provide the possibility to see the subjects and works that they are willing to talk about (HCD Toolkit, 2009). Three of the interviews were with professors at the head of departments who could better inform about the overall perspective and strategies regarding the educational goals. The interviews were semi-structured with a guiding questionnaire, but exploratory in nature (Saunders et al., 2009). An open-ended questionnaire was designed (appendix I) according to the discussions with researcher's mentors and other scholars, as a guide for maintaining the focus, which is needed to "collect specific kinds of data systematically" (Mintzberg, 1979). However, the questionnaire was slightly updated after the first interview as the first one was treated as a pilot.

The interviews contained several parts (figure 37). First questions were about topics around interviewee's work and courses to warm up the communication and also to identify if any critical factor is playing in the subject's environment that would affect answers for further questions. Second, they were asked to talk about diversity in their courses, what type of diversities do they focus on, and what efforts take place in case of training

students about diversity. This was mainly to seek if thinking diversity was anyhow considered before researcher directly points at it. Third, they would be guided to focus on thinking diversity and if they are familiar with any model for thinking styles; if they consider it, or if they already have learning activities for it. Fourth, they would be asked to provide a detailed account on methods and tools they use, need, or willing to use for training about thinking diversity. Finally, The interviewees were encouraged to describe in detail about their point of view on the form of desired methods for that realm and express their wishes and opinions about this research project. As a result, the very last intended question during the interviews was to directly ask for their opinion regarding the idea behind the proposed model (MPM). Because, some of them may have no idea of what is possible. The positive side of using an interview is that it can be targeted and insightful. However, on the other side is the possibility of getting biased results due to poorly articulated questions or responses, lack of recalling something in the moment, and affects of interviewer on responds (Yin, 2009). Therefore, learning and experiences from earlier interviewing project was used, which backs to 2009-2010 (within a corporate culture change project under supervision and trainings of one of my professors in the role of consultant and that is to say that it was tried to act as a good listener, remain neutral, and be adaptive and flexible in order to acquire unbiased notions (Yin, 2009). Findings in deeper lever occurred by asking 'how' and 'why' questions. In addition, instructions and guidelines for conducting interviews, provided by Silverman (2005), were reviewed. These reasons are to claim that this research was not distorted by biased behavior from researcher's side.

"If I had asked people what they wanted, they would have said faster horses."
~Henry Ford,

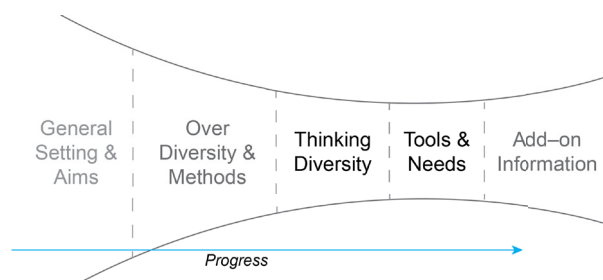


Figure 37. General pattern of conducted interviews

In next step, the recorded interviews were transformed to transcripts in order to be analyzed systematically. Thus, transcripts were made as accurate word-to-word replications. Then, they were cascaded into several categories (shown in figure 38). Each statement was sorted and classified into one of categories (Miles & Huberman, 1996). The first category contained all the statements regarding general settings of study program, properties regarding the course and its students, etc., in order to capture any factor playing critical role in related topics. The second category was related to diversity in general view, types of diversities considered, and any used training tool or method. Third category was about thinking diversity in particular, awareness about it, its importance, or any types of training on that topic. And the last category was set for desires about related trainings (thinking diversity) and also its format. This partitioning helps in identifying and interpreting underlying meanings (Graneheim & Lundman, 2004). Next, researcher's result of an analysis on one of transcripts was compared with the results of analysis of the same transcript from another researcher (for favor) in order to check the reliability of the results (Kvale, 1996) and to employ triangulation. To analyze the data analytic induction method was used, as it is a common method in qualitative research. The method helps in testing hypothesizes and theories (SAGE, 2006). As a result, interviewees' most relevant and important information were put into a table, by the (mentioned) categories and afterwards, they were summarized into key points and keywords. This way, the study was better able to draw out highlights and similarities for analysis.

| | NATURE OF COURSE | EDUCATING DIVERSITY | COGNITIVE DIVERSITY | METHOD USING |
|----------|---|---|--|---|
| Person 1 | <ul style="list-style-type: none"> • diversity in nature of course • diversity to deal with complexity • diversity for having different perspectives and alternatives • Beneficial to have diverse teams • an aim of program is make people know their differences | <ul style="list-style-type: none"> • awareness of differences & similarities needed • they should know who has the knowledge • sensitive topic • students may begin stereotyping • danger of leading to being unfair • not interested in personality / gender | <ul style="list-style-type: none"> • need for: preferences of communication, decision-making, knowledge generation method, approach for problem-solving, way of finding | <ul style="list-style-type: none"> • currently using 2 self-developed tools. They're the best we've got. They're under develop • they are to map knowledge and to visual cases for similarities & differences in team • other tools are one or two dimensional too much on personality or thinking style • we need sth. for big challenges in team effort |

| | | | | |
|----------|--|---|---|---|
| | <ul style="list-style-type: none"> • few months and few weeks | <ul style="list-style-type: none"> • diversity or such • some are keen to understand, some may not care • They can benefit from diversity if know how • proceed with caution • we have to show the complexity of diversity and at same time simplify it • When do you think it's enough once started teaching it? • important is not only to show differences but also how to overcome them? • How can we actually evaluate how we are different? • Two types are important for us: cultural & functional • e.g. Personality trait is not big issue | <ul style="list-style-type: none"> problems | <ul style="list-style-type: none"> • don't like tools putting you in a box • current tools in use take long time and/with administration and one team at a time • but their visualization makes it easy to understand & remember • good that current tools relate directly to the project context • I know some of tools & Myers Briggs might others be useful • I don't use them because they don't give much • why should I tell sb. That you're an extrovert? • sth. rather than measurement is needed i.e. visualizer • if you develop a tool I would like to see it don't say I am this or that but displays how I interact • the challenge is to standardize it without putting sb. In a basket • sth. that people without administration do wrong because behind the tool is a knowledge they don't know • It can take much of my course and more than few intensive days, it can have time span of the course long – students must understand why they are doing it |
| Person 2 | <ul style="list-style-type: none"> • various courses with multidisciplinary nature • objective is rather than teaching diversity such as multidisciplinary • mostly courses are not aiming to teach diversity but students are highly diverse • Different layers of learning: individual by making sense in head, team by learning working together, community, like creating network • we need to teach them teamwork • Aim is to imitate real life. • we have teams that struggle but overall it's fine • Part of program is to learn how to work with other professionals • from weeks to months length varies | <ul style="list-style-type: none"> • students must learn about diversity • when having a team aim is to make it functional as much as possible • very important is to teach basics of diversity, how they can use it, what are the mechanisms, that is partly what we tend to do • knowing diversity helps you to setup a team right • functional diversity & cultural diversity are important • functional diversity as for disciplines are different in: way of doing things & understanding models • diversity in discipline related to how they tend to think | <ul style="list-style-type: none"> • considered cognitive styles as part of personalities • If possible cognitive diversity should be taken into account • due to lack of data, we consider it in a rough way • something we don't do very well so we need to improve | <ul style="list-style-type: none"> • perhaps we could make them aware that i.e. these are available for their future • currently we do a very rough approach • can be better • not sure if with measurement tool we get better teams • nor they can be simple performers, doers, calculators, (team roles). They have some of each • no box to lock people into • hesitation for possibility of systematized method for • for timing, it can span through out some of courses |
| Person 3 | <ul style="list-style-type: none"> • various courses with diversity in nature • multidisciplinary (multiple knowledge) is needed for complex issues today • diverse teams can easily fail so students have to be trained | <ul style="list-style-type: none"> • diversity in background, discipline, culture, age, sex, and language • personal diversity in individual level and professional level • students definitely need to learn about | <ul style="list-style-type: none"> • students must learn how to deal with different opinions, argues, and ways • University management | <ul style="list-style-type: none"> • main form of method for us is students do projects together and have common discussion • We don't have expert in our program to fill the gap • Anything that helps in showing what is happening is definitely needed. • talk to person in charge |

| | | | | |
|----------|---|--|---|--|
| | <ul style="list-style-type: none"> • students of this program must be able to talk in a way that everybody understand • we need feedbacks because we want to improve it • Whole program is for diversity • few weeks and six month | <div>diversity</div> <ul style="list-style-type: none"> • you have to be trained how to deal with different people • you should put all things together and build on those • training is needed also to handle conflicts • diversity is complex, it means also conflicts. Making things done in the beginning isn't easy | (general) may not really understand diversity in my opinion | |
| Person 4 | <ul style="list-style-type: none"> • course much relevant to communication skills, facilitation, & creative cooperation • giving awareness is the aim and then skills • finding ability to work with acknowledging others' attitudes & values • two days | <ul style="list-style-type: none"> • diversity is highly important to be understood, learnt, • diversity all the time in real life • diverse teams • it is a challenge that there is more than one type • there is diversity in every discipline i.e. cultural diversity • we have different levels for diversity: genes & what is making it inherent & shapes personality, then there is what we learn & experience, culture & environment • awareness that we aren't the same | <ul style="list-style-type: none"> • if you have a hammer, you see everything as a nail • we have our own mental model and that needs to be understood • It would be highly beneficial to discuss thinking diversity in advance because makes huge effect in long term | <ul style="list-style-type: none"> • needed to give awareness • various methods are used • even encouraging student to make their own • measurement for what? • would be very useful if students learn to acquire information regarding thinking styles independently • preferring to have exercises and then discussion of what happened & what is found • visualization of styles are appreciated as well for communication styles • regarding timing, the course is super short but there can be time for a very short learning |
| Person 5 | <ul style="list-style-type: none"> • diverse in nature • general assumptions for diversity • revealing diversity challenges • different perspectives needed • innovation and creative work in core of its nature • need for understanding what others are talking about • bad experiences in teamwork and there was no guidelines for team dynamics available • four months | <ul style="list-style-type: none"> • Better understanding of other views and improve • diversity in discipline, personality, experiences, skills, personal objectives, and wills • learning about diversity is not a better thing it is a must for our working environment • an effort to teach more for how to work with each other • we are not familiar with existing models • diversity is good if you have basis to build on • we talk a little on personality | <ul style="list-style-type: none"> • points of view • understanding nature of perspectives and their strength • thinking styles should be learnt • though working in studio: fro different approaches • understand how to balance team | <ul style="list-style-type: none"> • we had an expert but after all we didn't receive effective results, maybe just useful for some • so far left out to luck • a method that could help them understand their different ways of doing things and consider it independently is beneficial • practical not just e.g. slideshows • timing: like some sets of e.g. three hours workshop or an intensive time in the beginning is doable • we would like to have a good method! |
| Person 6 | <ul style="list-style-type: none"> • we have teamwork and diversity in background • The program has established to lower down the wall between disciplines & get exposed to each other • people don't respect others & think they can be as good as they are • they should stop stereotyping | <ul style="list-style-type: none"> • if they learn about diversity can improve abilities in working life • there is a demand while some don't appreciate it much • training would be useful for doctoral edu. as well. although master is more practical • cultural & disciplinary diversity highly matters | <ul style="list-style-type: none"> • we want understanding of other ways of thinking & doing things • this is relatively undeveloped in university • needed understanding of: different ways of problem– | <ul style="list-style-type: none"> • currently we give ideas and awareness regarding cultural diversity • aren't using any specific tool • we try to develop our methods • We need sth. that represent there is not only one way acceptable. • measurement tool is not suggested as it can deliver meaning blinding from other truth • it would be interesting & useful also considerable for curriculum |

| | | | | |
|--|---|--|---|--|
| | <ul style="list-style-type: none"> • concern of people get too narrowed and stuck with their way & not open to others • Engineers get narrower, get good grades, but socially get bad • course is not directly related to this topic • few days & few weeks | | solving, understanding individuals, capacities, and why collaboration is needed | if a method make them understand independently • regarding timing, although this is important but we have limitations |
|--|---|--|---|--|

Figure 38. Table of content analysis from interviews

3.3 CONDUCTED EXPERIMENTS

The interview had been conducted in order to verify the need for MPM, but yet two key questions are still remaining to be answered. These questions are according to the second and third objectives determined for this thesis:

- Objective number two in the form of research question: is MPM valid? –Meaning if MPM delivers valid results.
- Objective number three in the form of a research: is MPM functional? –Meaning if MPM works in practice?

For each of these questions, a particular experiment was designed and conducted as qualitative study targeting a certain criteria and tasks. Subjects of these experiments were Aalto students (mainly master students) coming from different backgrounds and disciplines. Subjects were also three groups of students. Each group was participating in one of these courses:

- Interdisciplinary Product Development (IDBM –figure 40)
- Product Development Program (PDP in ADF)
- Information Technology Program (summer school from Aalto school of Economics –figure 43)

These groups were chosen for the study because of the following reasons:

- These groups were among the most available and accessible groups for this study.

- These studies were partially conducted for both IDBM and ADF as the heads of these programs found potential value in it for their programs (e.g. Salimäki, 2011). Which would make them considerably relevant choices for these experiments.
- All these programs have an inherent commonality, which is their approach in bringing diversity (diverse backgrounds from different schools) for becoming prepared to operate in emerging/global business environment (e.g. IDBM, 2013; ITP, 2012) and that means higher chance for finding results from different thinking styles.

Target experiments were taken place within one session with time variation of one and half hours to two and half hours. This variation of time has been due to the agreed amount of time with the coordinators of the courses and not due to any obstacle threatening the study. Although it was tried to find the most suitable timing of the day for implementation, but for instance, the session may have been after lunchtime, which could affect the student's effectiveness. Thus, from the researcher side, it was tried to keep the climate of the session in a suitable manner by using some small technics learned from 'training the trainer' workshops –in summer 2011 (DCI, 2011)– such as: use of sound, physical movement in between activities, and giving small interactive tasks to the participants, in a way that they would not affect the target activities. This is why one of the experiments with PDP group was repeated (only this time with another team) to ensure about the quality of the session as well as results. Besides that, the design of the whole session and experiments were learned from training methods of Arthur Carmazzi (2010) in Directive Communication International* (DCI). In addition, at the end of each session a time was given to participants to have open discussions and to hear further comments that would suggest a point in importance for the study (see figure 39).

* Researcher was personally trained by DCI on 2010 and worked there in 2011, when this project was triggered.

| INTRODUCTION | PREPERATION | OVERVIEW | OFFERING | EXAMPLES | EXPERIMENT 1 | EXPERIMENT 2 | DISCUSSION |
|-------------------|----------------------------|--|-----------------------------------|----------------------------|-------------------------|------------------------------|-----------------------------|
| Self introduction | Raising awareness of Topic | General theories on thinking diversity | Introducing MPM & its functioning | Giving example of dynamics | Testing validity of MPM | Testing functionality of MPM | Open discussion & feedbacks |

Figure 39. Method of approach for conducted experiments

The procedure for conducting experiments has been somewhat simple. Within the few hours time, first, an introduction about the trainer and his topic for the session was provided. Starting with few engaging questions to think of the situations and the problems where thinking diversity may have played an important role, it was tried to raise participants' attention to the topic. Also, some statements and insights from some of scholars referring to the issue were mentioned. In example:

"Have you ever faced anyone thinking of certain ways about how things should be done and that had been dramatically in contrast with yours?"

"Have you experienced a situation where you think you are saying something obvious and understandable and you expect the other person to simply get it and surprisingly you noticed that he or she finds it difficult to understand?"

"We have placed spaceships on the moon and produced countless supports for our physical comfort –yet in our collective endeavors and basic interactions with one another we often seem to fail. –S. Seagal"

"Most of us assume we're seeing the world the way it really is. –N. Herrmann"

Second step was typically a quick touch on the topics such as structure of brain, how it can make us different, and some other thoughts referring to other models (i.e. Myers Briggs, Whole Brain, etc.). For example:

"I am my Connectome. –S. Seung"

"There are four distinctive thinking styles. –N. Herrmann"



Figure 40. Session with the IDBM students from IPD course in ADF, 2012

Third phase was when it got to MPM model and briefly described how it was created. Also, its purpose and what it is meant to do was explained. At this phase, the participants received a copy of empty MPM form (appendix H) to have a look as if needed, but they were asked to wait for filling it. An example statement for this part is:

“By placing a dot on each scale you can show that your preference is toward which side of the scale... which means you need eight dots at the end as it is shown in the example... as you will see, no one can cover the whole frame... and that seems to be important; that we need each other... this tool is giving the key factors we need to take into account in order to find out which side one’s tendencies are toward... and also identify the key preferences of a person that need to be considered.”

Fourth step had been the part, which examples were given. Four styles from Whole Brain model or five personality dynamics from Human Dynamics (figure 41) could be mentioned. This time, Human Dynamics was a better option as Seagal had included a clear table for activity rhythm of each personality dynamics in her theories. This was highly needed for ‘experiment No.1’. Provided that, five examples were explained with their key differences in the preferred way of thinking and doing things. This happened with referencing particular set of factors from MPM according to the dynamics. Moreover, a short video was shown at the end of each example to support learning and remembering.

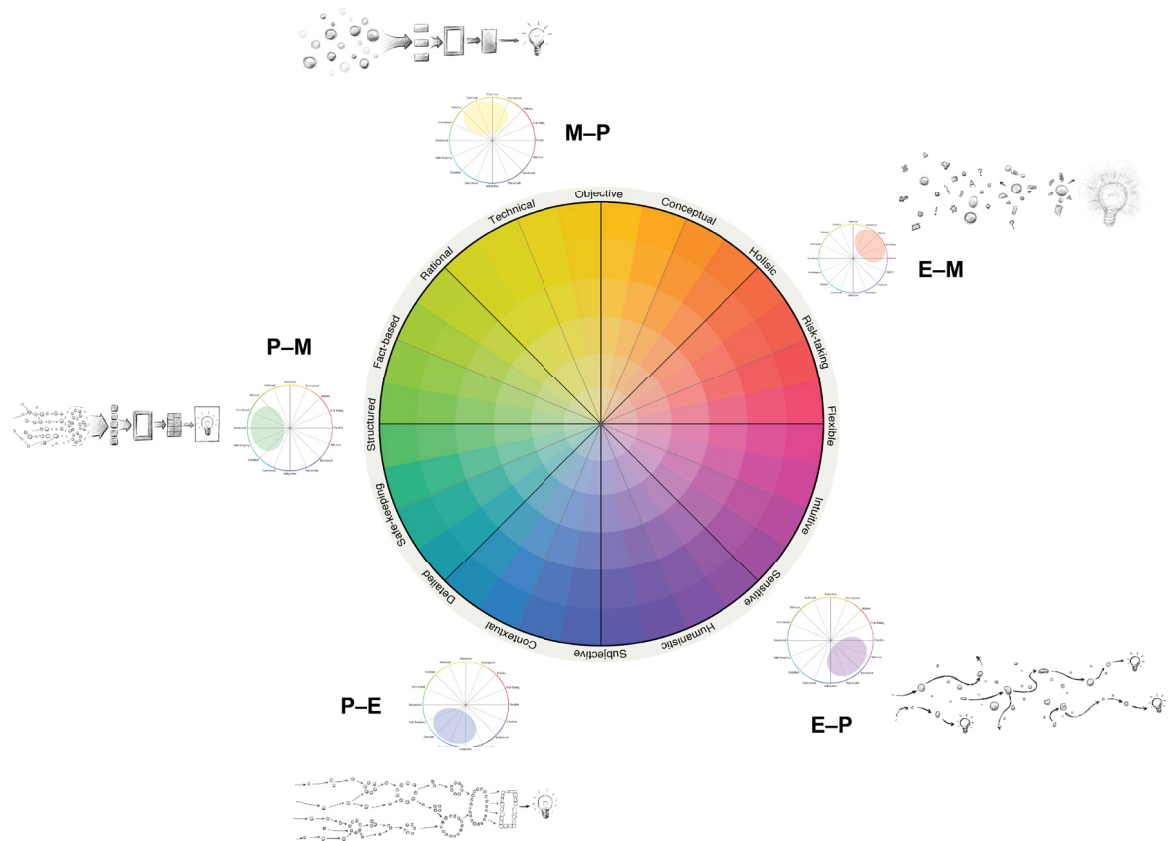


Figure 41. MPM with examples of personality dynamics from Seagal (1997)

In order to ease explanation about examples, colors were used. A spectrum of ‘colors’ (as shown above) has been used to help in referring to a particular side within the frame. The place of colors has been adjusted and determined purposefully and not randomly (see figure 42). According to Augustin (Forbes, 2014), an expert on user-centered design, colors communicate and affect perception and through what she calls ‘design with science’, we can use them in design ‘in a right way’. The following table represents the meanings of each color and that speaks for why those colors are in current position in the frame. It must be noted that it was tried to use the whole set of main colors to back up the notion of whole brain concept, through diversity.

| COLOR | MEANINGS | FACTORS |
|-----------|--|-------------------------|
| Red | Action, desire, energy, spontaneous, rebellious, courage, etc. | Flexible, Risk-taker |
| Orange | Risk-taker, optimistic, enthusiasm, creative, encourage, etc. | Risk-taker |
| Yellow | Intellect, attention, clarity, academic, challenging, analytical, etc. | Rational, Technical |
| Green | Independent, tactful, practical, safety, finance, stability, etc. | Structured, Safe-keeper |
| Turquoise | Solid, calmness, clear, logical, stability, self-centered, etc. | Safe-keeper |
| Blue | Stability, calm, expertise, responsible, orderly, conservative, etc. | Safe-keeper, Contextual |
| Purple | Sincere, humanitarian, responsible, selfless, Intuitive, etc. | Humanistic, Intuitive |
| Magenta | Romantic, emotional, supportive, nurturing, artistic, etc. | Emotional, Intuitive |

Figure 42. Meaning of colors & their relation to the factors; according to Color Wheel Pro (2002) & Scott-Kemmis (2009)

During the Fifth step, Experiment No.1 and during the sixth and final step, Experiment No.2, were taken place. These experiments are described in detail in the following sub-sections.

3.1.2 EXPERIMENT No.1

The research question regarding the validity of MPM is addressed by employing a qualitative study on the three subject groups. However, this study is not without its limitations, risk of distortion, and as well possibility for acquiring biased information. This is in regard to the subjective nature of the study, role and quality of the trainer, and possibility of unauthorized (solo work on tasks) interactions between participants. For that reason, this study did not find it sufficient to rely on only one group and one experiment. Thus it was conducted several times, which of what three have been chosen as the best cases for this study.



Figure 43. Session with ITP students in Aalto school of Economics, 2013

During experiment No.1, students were asked to carry out two tasks. These tasks were mandatory for analysis of validity of the proposed model. The aim was to collect a Mental Preferences Profile (MPP) of each participant and compare it to his/her activity rhythm in order to check if both of them represent same personality dynamic —described in theoretical part. Such case-by-case examination happened to all the documents collected from participants. In overall, thirty-one complete documents (31 participants x 2 types of task documents) were gathered during this study. Notably, during current research project (since 2011) near hundred (similar) documents have been collected and analyzed. But only thirty-one samples were from the three selected groups for this study. Hence, for the sake of focus, the other samples are ignored in this thesis book.

First task given to participants was to fill their form of profile (MPP), which was provided during phase three. During this task participants were required to do the self-inventory and place eight marks similar to the given examples and reflect their tendencies toward each factor in the context of project environment. This task was conducted within five minutes time, if

convinced that every participant has accomplished the task. This occurred after ensuring that they have gained clarity regarding the task. In some cases, the form was replaced with a new one for due to any hesitation or mistake. Meanwhile, personal assistance was offered as an option for those who needed help for the task and answer with certitude.

After the first task, the experiment proceeded to the second one. This time the participants were asked to do an unprecedented project. Unprecedented, because it would reduce the copy power and as well ability to use what has already been learnt. This way, the study could achieve better results for showing how these individuals tend to do the project themselves. The objective was to find their activity rhythm to be compared with their MPP. Therefore, they were asked to do a project as described here (appendix J):

- *All the iron resources in the world's existing mines have been used up.*
- *There is plenty of iron under the Antarctic ice sheet.*
- *No one has extracted resources from Antarctica so far.*
- *We need you to do this project, in order to produce iron again.*
- *In six steps, present what would you do to extract iron from Antarctica.*

To accomplish analysis for validity of MPM, all documents filled for the two tasks (2 forms x 31 subjects), were gathered. Subjects were studied one-by-one. Consequently, the statements from second task within the six brackets were translated into an activity type –selecting from one of the followings (Seagal & Horne, 1997):

1. Collecting/organizing information
2. Processing & mapping
3. Action/implementation

The sequence of actions taken was checked with the table of activity rhythms (shown in figure 28) to find out which of those patterns coincide with the sample. The type of personality dynamic of the subject (creator of the

sample) can be identified through analyzing activities with being sensitive toward key acts related to each dynamics, which all have been noted in the theoretical background. On the other hand MPM suggests that each of those personality dynamics have tendencies toward a particular side of the frame (particular factors). As a result, by comparing each subject's MPP to his/her activity rhythm (figure 44), it would be possible to determine if MPM is showing the right (expected) result. This study ensured that it has collected sufficient samples from all dynamics and otherwise more samples would be collected.

| SUBJ. | ACTIVITIES | IN STEPS | RHYTHM | KEY ACTS | TYPE |
|--------|---|---|---|--|------|
| Case A | Gather information and research > get experts & consultants > discuss the situation and possibilities how to do it > check the budget and feasibility > taking resources to Antarctica > extracted | Research > Consults > Planning > Checking > Implementing | Collecting info > Collecting info > Processing & mapping > Processing > Implementing > | Identified that checking & finance are emphasized | M-P |
| Case B | Assemble a talented team & experts > travel around the world to inspire ideas and benchmark > synthesis ideas for concepts (in team) > collect resources > extract > follow up (the process) & maintain needs | Entourage assembly > Inspiration > Brainstorm > Prepare > Extract > Follow | Acting > Collecting info > Processing > Acting > Implementing > Implementing & Processing | Identified collecting info for ideas & action-oriented | E-M |
| Case C | Find partners & funding > get some staff, buy or make equipment, and prepare the trip > construct facilities in Antarctica > start working & extract iron, take care, side activities & engagements > sell iron, make profit > build better company, evolve & business opportunities | Idea> Planning 1, funding & business model > Planning 2 & logistics > Working > Profit making > Evolve & evaluate | Acting & mapping > Mapping & acting > Acting > Acting > Processing & acting | Identified non-linear process & collective enjoyment | E-P |
| Case D | I gather some information about the project > search methods about extracting iron from Antarctica > consult experts of the relevant field about extraction of Iron > specify the work, plan, and stages that should be followed > prepare the equipment, human resource, and start the project | Information gathering > gather a list > consulting > planning > Start working | Collecting info > Organizing info > Collecting info > Mapping > Implementation | Identified much data gathering | P-E |
| Case E | Identifying best locations for extracting iron > observing circumstances & identifying needs > getting everything | Research > Research > Planning > | Collecting info > Collecting info & mapping > | Clarifying first & Complete | P-M |

| | | | | | |
|--|---|--------------------------------|---|---------------------|--|
| | ready, schedule, etc. > go to Antarctica & make preparations locally > extract, do the work and clean the site afterwards > list what could be done differently next time to improve operation & procedures | Set-up> operations > Reporting | Planning > Implementing > Implementing > Processing | planning identified | |
|--|---|--------------------------------|---|---------------------|--|

* TYPE column is for type of personality dynamic based on Seagal (1997)

Figure 44. Interpretation pattern of collected data from second task of experiment No.1

3.1.2 EXPERIMENT No.2

Second experiment was conducted in the last step to find out about the functionality of MPM. This is addressed by employing a qualitative study on the three subject groups. This study the same as previous one, is not without risk of getting distorted information. This is because of the subjective nature of the study, role of the facilitator, and collective response of participants. To minimize the risks and to ensure about the quality of the test the study did not find it sufficient to rely on only one group and one experiment and thus looked at all three student groups. In addition, the experiment was filmed and a friend (unfamiliar with the experiment) was hired to avoid misinterpretation. Also, some short and completely informal discussions happened with some participants afterwards to hear their personal feedback and comments in case they were not willing to mention them in the crowd.

During this experiment, students were asked to watch a video and after that discuss about the subjects in the film and express what they think about each subject's thinking preferences. The video* was about three and half minutes (00:03:40) and it displays a scene from the TV show 'America's got talent' where it shows a performance of a young girl and at the same time three judges who are observing her and then comment on her performance (figure 45; see appendix K). Participants were expected to be able to identify some factors regarding their thinking preferences by the end of session.

* Similar videos have been used by 'Directive Communication International' (2010–2011) for training purposes.

However, the video may lack all types of personality dynamics. The characters (judges) in the video are famous TV stars (IMDB, n.d.) such as:

1. Brandy Norwood (character 1): *Actress & recording artist, born in McComb, Mississippi in 1979.*
2. Piers Morgan (character 2): *Famous journalist and actor, born in Newick, England in 1965.*
3. David Hasselhoff (character 3): *well-known actor, singer, and producer, born in Baltimore, Maryland in 1952.*

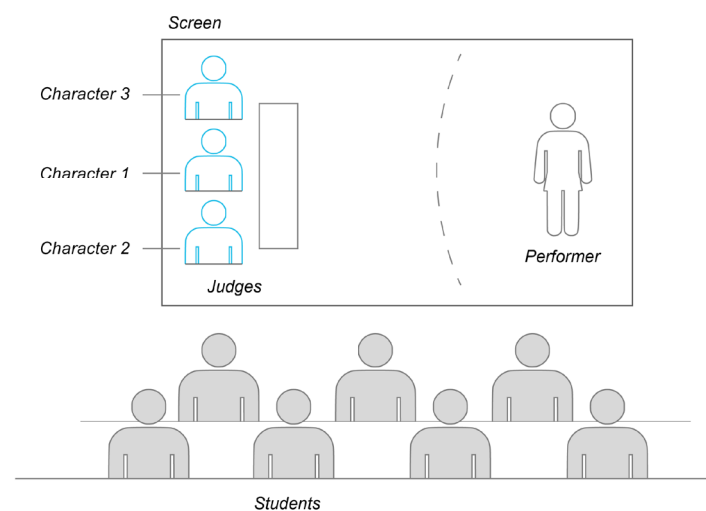


Figure 45. Experiment No.2

This experiment took about ten to fifteen minutes. In order to minimize unwanted effects from the environment on this experiment, the class was set to have a quite space, existence of proper level of light, and good screen and sound quality. Furthermore, the participants were asked to be ready before proceeding to show the video. As well, they were told to be open and freely express their opinions afterwards, which is essential for learning. The task for participants was fully explained. As an example:

"I am going to show you a scene from the show America's got talent... there will be three judges in the video... I want you to tell me afterwards, what key factors you found in them and which side of MPM their tendencies are more into... pay

attention to their comments and decision-making... try to sensitively observe their reactions, facial mimics, and body... don't let the performer distract you from your task... right down the points if you want to be able to discuss your finding at the end..."

As for the aim of this particular study, it is needed to determine whether the tool (MPM) would function for educators' training purposes. Hence, this experiment used the class environment and the task was designed to be collective. It means it would be accepted if students share their findings then possibly and eventually influence each other – because it is meant for class learning. The fact that this task –if conducted individually– could draw out other results and could be beneficial to carry out measures on the quality of the work from other perspective, is acknowledged. However, for this part of research project and for this study in particular it is enough to determine whether MPM can be used at all. Provided that, the study proceeded with the current method. Eventually, the same film was shown to all three groups and their responses were observed and collected for further analysis.

*"Our minds
are expresses
in the other
people. So the
notion of who
you are, you
often don't
know who you
are until you
see yourself in
interaction
with people."
~Read
Montague,
neuroscientist*

4. FINDINGS

In this chapter an overview of the findings is presented. The findings are organized around three major topics: need for an elegant method for educating students about diversity (interview), validity of proposed Mental Preferences Model (experiment No.1), and functionality of MPM to see if it would be usable for educators (experiment No.2). Each of the results for these topics is described in a separate section.

4.1 RESULTS OF INTERVIEW

The empirical data gathered by applying the method of interview, proved that there is a need for better methods than current ones —if any— in use to be utilized by educators who want their students learn about the aspects that are related to thinking diversity; such as diversity in: tendency in the way of doing things, decision-making, problem-solving, nature of perspectives, communication styles, so forth. So that students would be able to consider and employ them in their future work and collective efforts. The result is described in four subsections; first, implies what types of diversity found to be important; second, what educators think about thinking diversity for their courses; third, what about current tools and methods in use; and finally, what type of method is demanded.

4.1.1 ASPECTS OF DIVERSITY

The courses related to the intention of study were considered to be highly diverse either by the nature of program that they were part of or by the purpose of the course itself. Therefore, although some of those courses are aimed at incorporating trainings for diversities related to ‘working together’, but it was also found that the other courses that are given diverse —just by

their very nature— would also benefit from such learning. There were quite many aspects of diversity found to be important according to the interviewees, in total. These aspects were in (this is all the keywords they used): discipline and background, ethnical and cultural, functional, education, method of knowledge creation, communication style, decision-making, type of approach to problems, way of seeing problems, tendencies in thinking, personality, age, sex, language, attitudes and values, experiences, thinking styles, creativity, team (level), perspectives, strengths, learning styles, way of doing things, capacities, skills, and personal objectives. However, despite the fact that much of these aspects may find overlaps with each other, the level of their importance from the view of different interviewees had been noticed.

Despite the noted aspects of diversity, the aspects found by this study to be repeated (emphasized) all the way while having high importance are: discipline, culture, and cognitive. This is also because of controversial opinions on some of those aspects as well. For example it has been said:

“Personality trait is not a big issue” OR “not interested in personality or gender”

“(Cultural diversity) is the difference between nationality of an individual and the other team members. How it affects the team is through institutions, abilities, norms, adoptions... which brings certain preferences of communication, decision-making, etc.”

“I think of two (diversities), one functional diversity or disciplines they represent like engineers, doctors, business people... two, multi-cultural and multi-ethnicity. So diversity in terms of professional & in terms of cultural...”

“Different disciplines are based on different premises, in terms of knowledge generation... what tools we use to find solutions. In design it is different than in business school, which is based on economics & natural sciences... students have different approaches in terms of problem solving –how to uncover the problem and how to find a solution”

“We want them to understand (about the) other ways of thinking... and different ways of doing things... that is needed (for understanding) different ways of problem-solving... other individuals’ capacity... and why collaboration is needed”

4.1.2 COGNITIVE DIVERSITY

In particular, cognitive diversity* emerged in this study for having high importance in the programs or the courses, of which educators have been interviewed. Although, in some cases it was perceived that the interviewee is not properly aware of the matter or is unfamiliar with the term and the aspects of it. Sample quotes for this part would be:

“We have our own mental model and that needs to be understood”

“If possible, cognitive diversity should be taken into account... we should do some cognitive (studies) also but we haven’t done them to date... at least to make them aware that (what) exists”

“It would be highly beneficial to discuss thinking diversity in advance, because it can make a huge effect in longer term”

“Thinking styles and... their strength should be learned (needed for work) and... understand how to reach balance”

“What do you mean by thinking diversity? ... we want understanding of other ways of doing things”

“Hmm... Then this is relevantly undeveloped in (this) university”

“Even university (at management level) needs to understand it... I think they don’t”

* Cognitive diversity or thinking diversity; these term have been used in this thesis book interchangeably. This has been mentioned also during interviews.

4.1.3 TOOLS & METHODS

Investigation on methods or tools currently in use by interviewed educators found that mostly (five out of six cases) no systematic method has been used. None of the models and frameworks noted in the chapter of theoretical background, has been mentioned at by the interviewees except one case, which referred to Personality Traits and also Myers-Briggs that had been utilized but then it was disused. The same case had begun using two own-developed models, which were in use at the time. As being informed, they were created to do 'knowledge mapping' in team and to 'visualize cases' displaying similarities and differences in a team. Yet, these models need further improvements, according to the interviewee. Notably, this particular interviewee's work was highly associated with students' learning about diversity. Also, two of the interviewees mentioned that they have been using experts from outside; one case expressed that they have been using an expert for training matters but not anymore because, it was ineffective; the other case has been using different experts for different topics due to nature of the course, but each for a very short run and they have been more related to cultural and communicational aspects.

More importantly, the study found that none of the using methods had been related to thinking diversity. And despite the fact that they clearly referred to the importance of that aspect during interviews, yet they admitted that a suitable and systematic method is lacking –a problem that needs to be solved. For example they said:

“Currently, we are (only) giving them ideas and awareness regarding cultural diversity... but we are not using any specific tool”

“Main form of method for us (currently) is that students do projects together and then have common discussion”

“That is so far left out to luck... we are trying to develop our methods”

“Owned-developed tools... I think it’s the best I have so far... a personality test (e.g. Myers-Briggs) for me is not useful... (my tools) need development... (and) have to be administrated... that means you have to seat with teams that usually takes time”

“Currently, we do a very rough approach... (but) it can be better”

“There are those one or two dimensional models... (not good enough) we have to think further what is actually big challenges”

“We would like to find... we would like to have a good method we can use for the course”

4.1.4 NEEDING METHOD

The biggest and the final aim for interviews was to find out what kind of method or tool would satisfy the educators’ practical need in regards to thinking diversity. Consequently, finding the answer whether MPM has in fact any place for being used by similar educators or not. The empirically gathered information showed that there are some features demanded in case of getting a better method (figure 46). Ten key features were identified by this study:

1. Helps understanding thinking diversity
2. Gives awareness and displays varieties
3. Does not put people into a box
4. Could be used both in shorter time and long-run
5. To be practical and could relate to the context in teams
6. Empowers independent use (i.e. not relying on a questionnaire, other person to answer, etc.)
7. Promotes no better style (all respected)
8. Not to be a measurement tool
9. Preferably visualizer
10. With low risk in regards to lack of administration (being safe)

Examples for this part are:

“A method that could help them understand their different ways of doing things...consider it... and (independently) for their future”

“I don’t like putting you in a box...” and “...If you develop a tool, I would like to see it don’t say I am this or that... but displays how I interact...” and “...the challenge is to standardize it without putting somebody into a basket”

“Something rather than a measurement tool is needed... for instance a visualizer”

“(Not) to lock them into (a box)... they cannot be a simple performer, implementer, doer, calculator, etc. ...They have some of each”

“Something practical... not like slide shows and theories”

“It can have the time span of the course length... students must understand why they are doing it”

“It’s a sensitive topic... you have to make sure they don’t mistake without administration... because, behind the tool is a knowledge they don’t know”

“(Despite interest) the course is only two days, but there can be (considered) time for (such) learning”

“Presents there is not only one way acceptable... show them to understand and respect others... and why collaboration is needed”

“Although this is important, but we have (time) limitations...” and “...it would be interesting and useful also to (consider it) for curriculum... it that makes them independent”

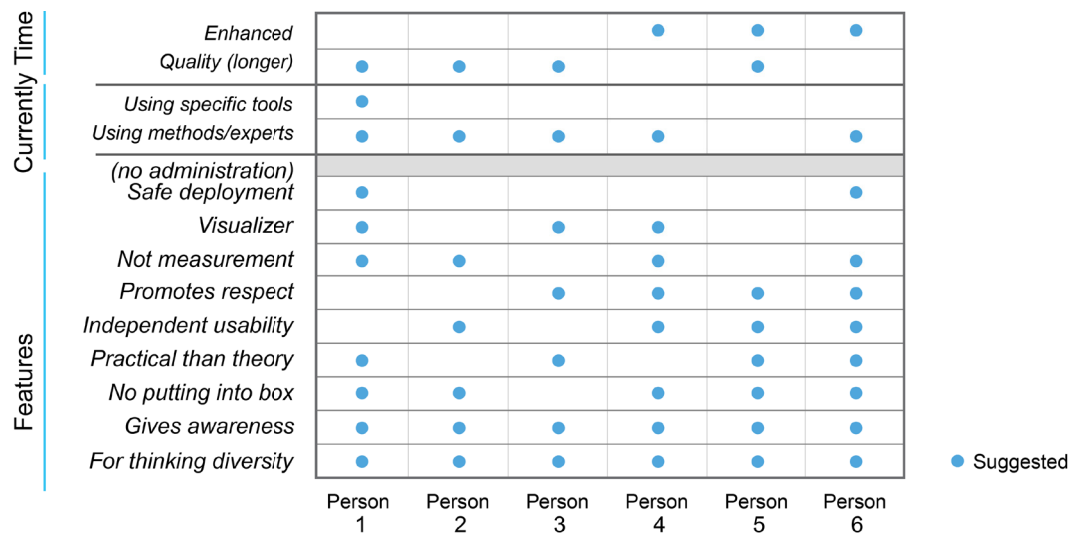


Figure 46. Results of interviews regarding needed method

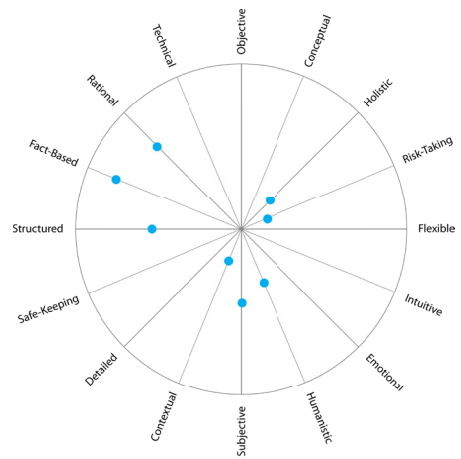
4.2 RESULTS FOR VALIDITY

In this section, the findings of the empirical research regarding the validity of MPM are presented (figure 47). The analysis of the results from conducted experiment suggests good results for validity of Mental Preferences Model. About 84% (26 out of 31) of the MPPs were with a clear match with the activity rhythm of the owner based on sample project, which was done as a task within experiment No.1. About 10% (3 out of 31) of MPPs were displaying unclear results (showing tendency toward more than one area at the same time), but yet cannot be judged as displaying unexpected type of personality dynamic (at list one of the areas were according to the activity rhythm). Only 6% of the results found to be delivering contradictory information, which in this case means only two out of thirty-one samples. Unfortunately, this research was unable to contact these two cases afterwards and make enquiries for the cause of that phenomenon. Here, all thirty-one cases are presented with their type of activity rhythm:

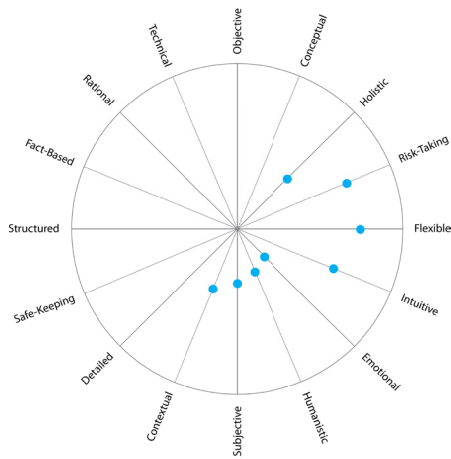
*"I didn't see
until I believed."
~Anonymous*



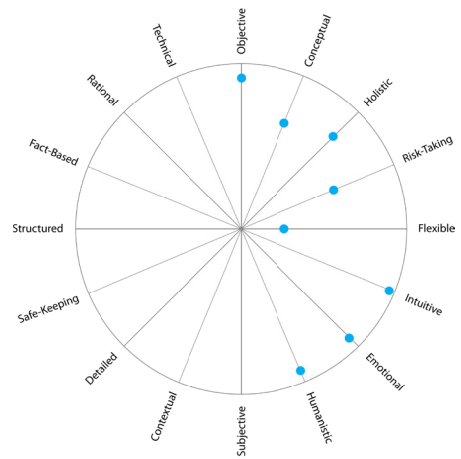
Case 01
Female — Marketing
E-P



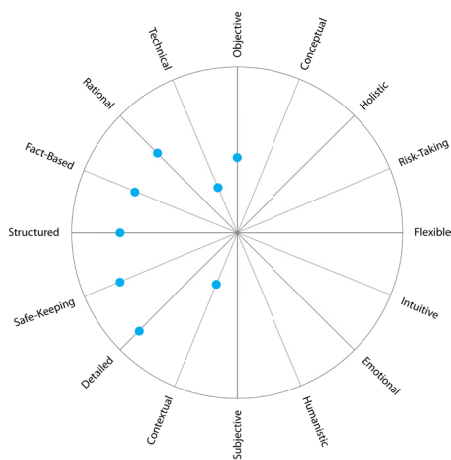
Case 02
Male — Engineering School
P-M



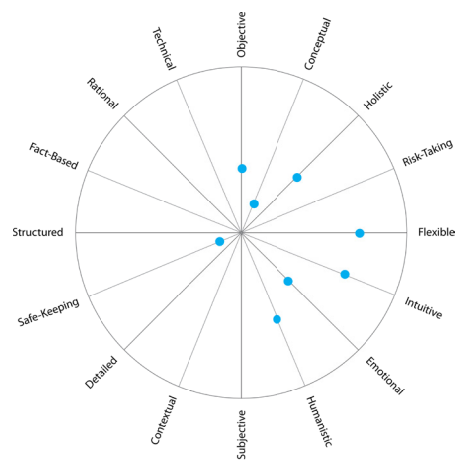
Case 03
Female — Business School
E-M



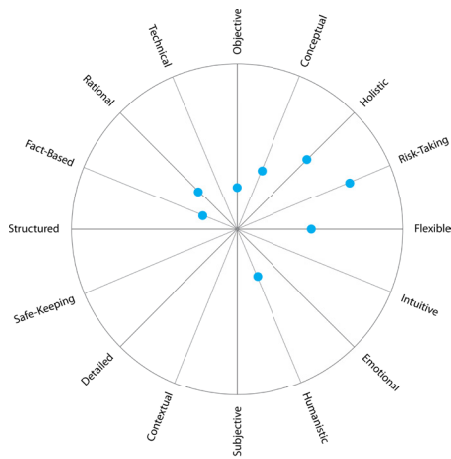
Case 04
Female — Business School
E-M



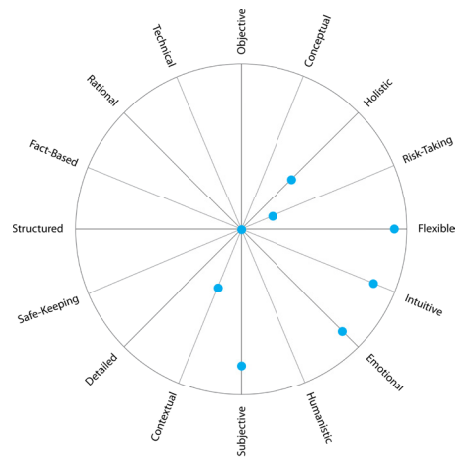
Case 05
Female — International Business
P-M



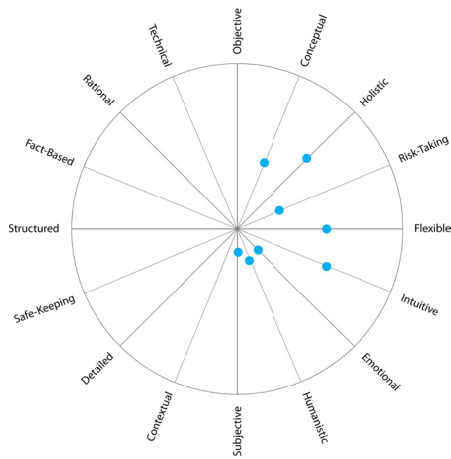
Case 06
Female — Graphic Design
E-P



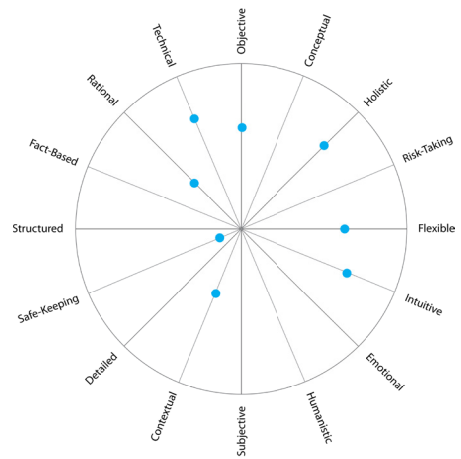
Case 07
Male — Business School
E-M



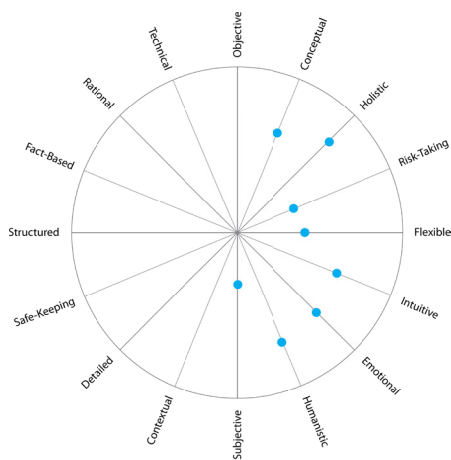
Case 08
Female — International Business
E-M



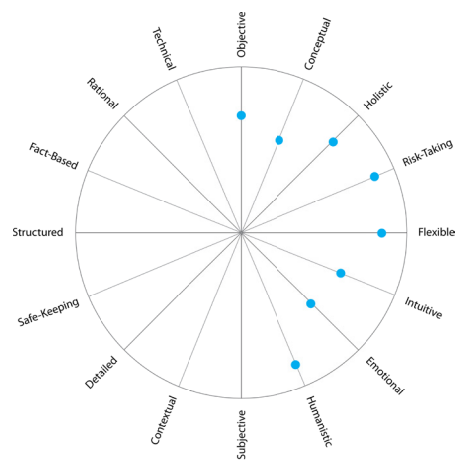
Case 09
Male — Software Engineering
E-M



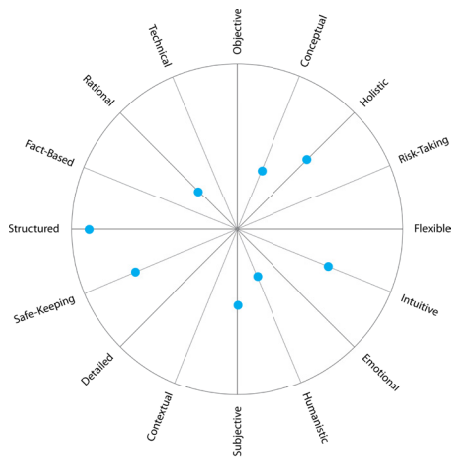
Case 10
Male — Design School
E-M



Case 11
Female — Civil Engineering
E-M



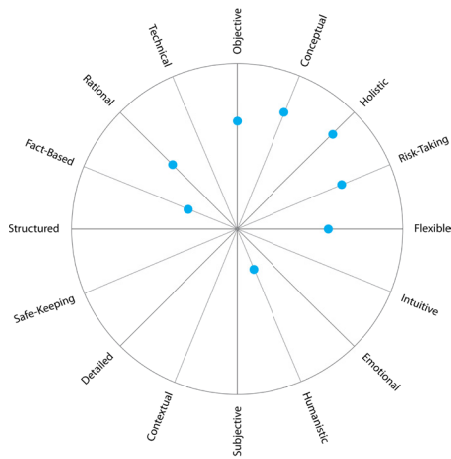
Case 12
Female — Graphic Design
E-M



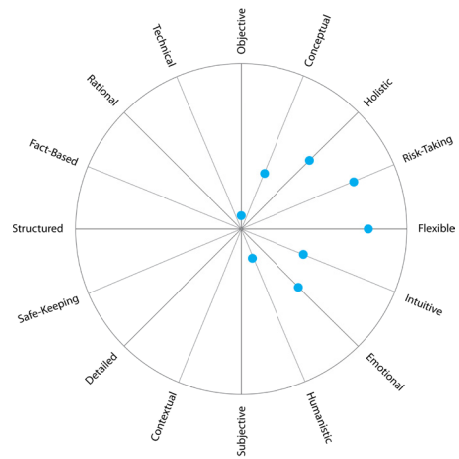
Case 13
Female — Banking Business
P-M



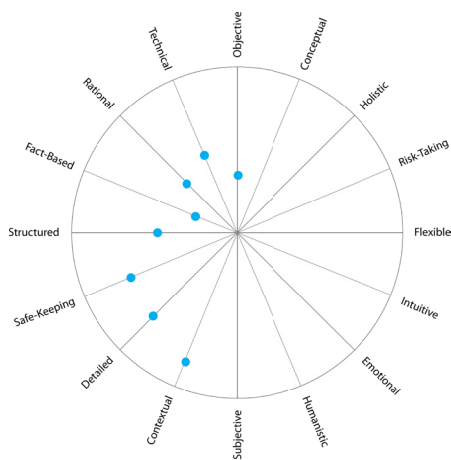
Case 14
Male — Telecommunication
E-P



Case 15
Male — Business Management
E-M



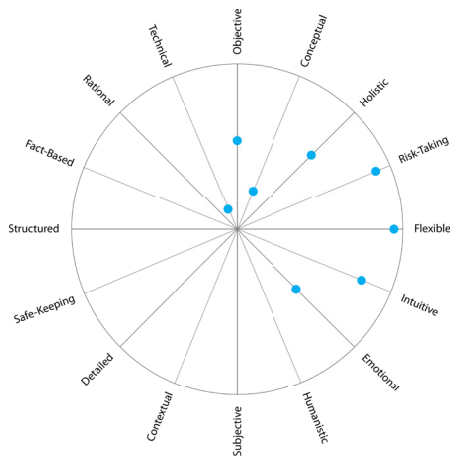
Case 16
Female — Interaction Design
E-M



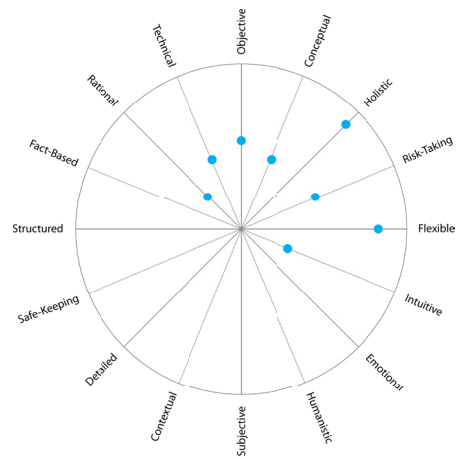
Case 17
Male — Civil Engineering
P-E



Case 18
Male — Electrical Engineer
E-M



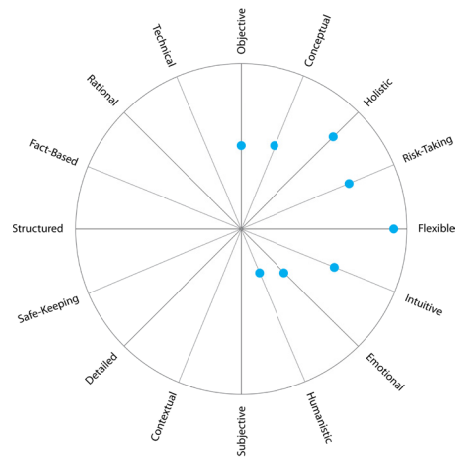
Case 19
Female — Industrial Designer
E-M



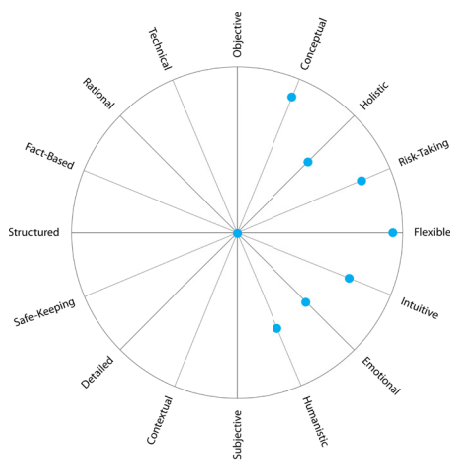
Case 20
Male — Designer / Design Manager
E-M



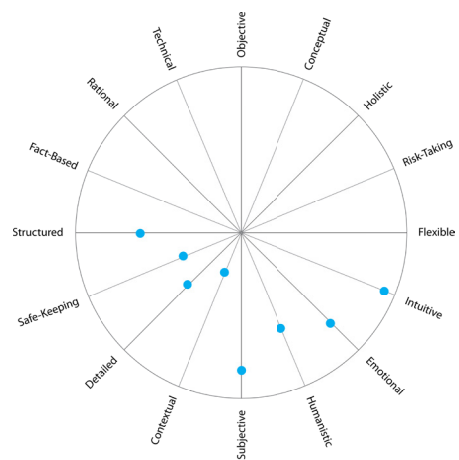
Case 21
Female — Service Designer
E-M



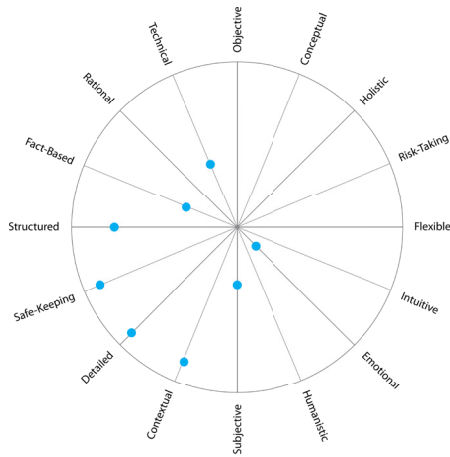
Case 22
Male — Engineering / Design
E-M



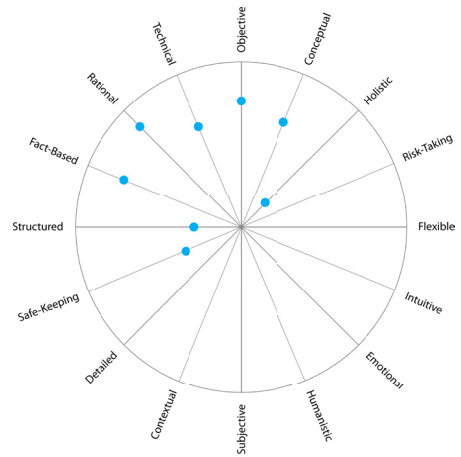
Case 23
Female — Business School
E-M



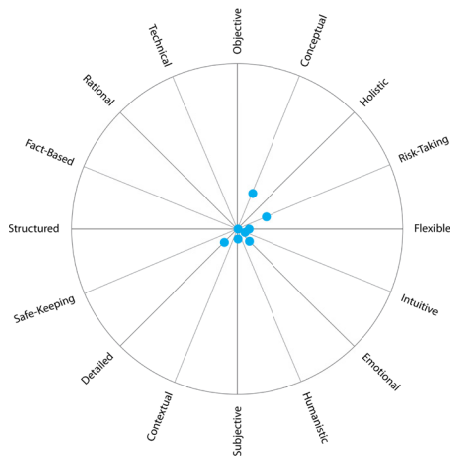
Case 24
Male — Graphic Design
E-P



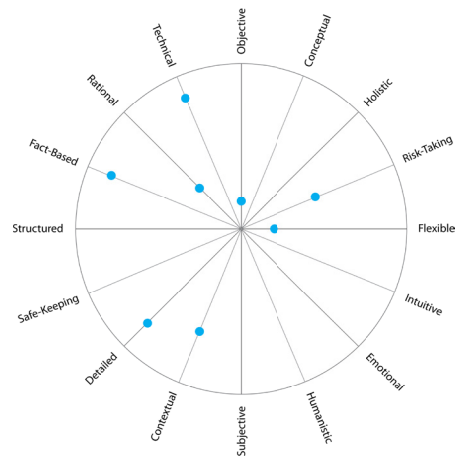
Case 25
Female — Mathematics
P-E



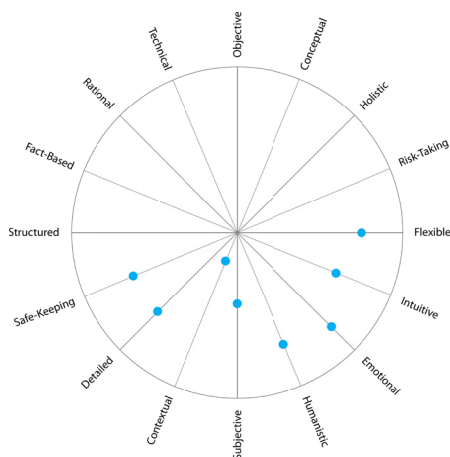
Case 26
Male — Product Management / Sports Coaching
M-P



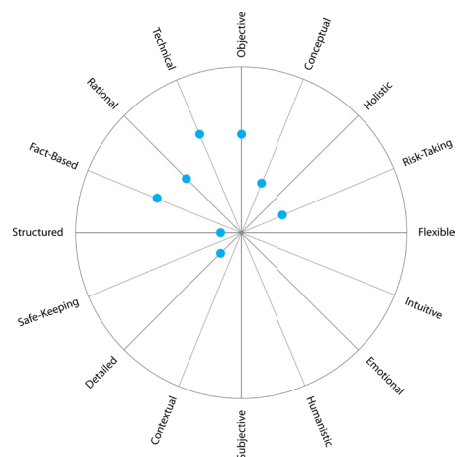
Case 27
Male — Game Design
E-M



Case 28
Female — Chemical Technology
M-P



Case 29
Female — Medicine & Surgery
E-P



Case 30
Male — Industrial Design
M-P

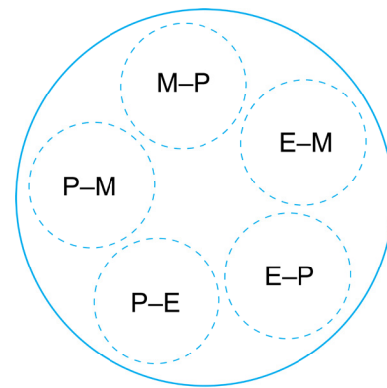
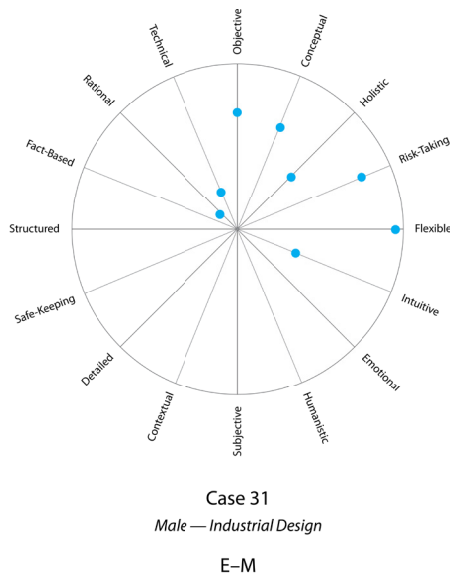


Figure 47. Comparing MPPs with personality dynamics

Additionally, this study found some further results to be interesting. Some of these insights are presented here:

"We don't see things as they are, we see things as we are."
~Anais Nin,
author

- 1) More than half of profiles were more similar to E-M type of personality dynamic, which was not a surprise as the nature of the courses was more likely to be demanding what is more interesting for this group (according to both Whole Brain and Human Dynamics).
- 2) Some cases like case 13, case 28, and case 04 were reflecting some high tendencies toward some other factors that may not be expected from a personality dynamic as theirs at first, but it does not contradict findings of Herrmann (1996) through HBDI. Such cases seem to need more analysis and open opportunity for further study.
- 3) Case 27 found to be unique in a way; it reflects slight tendency toward upper-right, but still it is pretty much centered in the frame.
- 4) Interestingly, there were some cases with a background that might be known as what some people call as 'hardcore

engineering' and their samples showed different results than what would be typically expected from them. Some of them (e.g. case 18) even answered the task by drawing in the boxes for describing their steps in task 2 of experiment No.1, which was in a similar way to what some of designers did.

4.3 RESULTS FOR FUNCTIONALITY

In this section, the findings of the empirical research regarding the functionality of MPM are presented. The analysis of the results from the conducted experiment suggests that Mental Preferences Model has been functional in class. However, the findings were limited since the experiment was conducted just by the developer of the model (usage by others needs to be tested) and also, the results belong to analysis of 'group response' and did not take a deeper effort to see if it had been effective at individual level as well. After all, this experiment showed that there were number of students who could successfully apply MPM for identifying facts about each character in the video. They were able to identify several factors in their behavior and even suggest which side of frame (MPM) their tendencies are more into. For this reason, it is agreeable for this study that MPM was able to be utilized and function after between one and half to two and half hours training session.

According to experiment No.2, there had been three characters in the shown video that had to be analyzed by students. Except for a minority of respondents, most comments were found to be good results of linking characters' identified attitudes to particular key factors (in MPM). The minorities with (what majorities perceived as) 'wrong' responses were quickly criticized by others' comments. This led to back and forth discussions for a period of time, and eventually led to common conclusions (as far as could be observed), except one case. However, this type of discussions seemed to be fruitful in terms of learning because at least some of those participants in silence began to engage and decide for the 'right' conclusion by e.g. shaking

their head indicating confirmation or disagreement, after a while. Overall, between seventy seven to eighty three percent (77–83%) of verbal respondents, found the factors that were finally agreed upon at the end of session. Nonetheless, findings by this study in more details are described for each group in following subsections. In addition, list of items below, are used to map participants' findings –their comments referred to these items (figure 48):

Character 1:

Item 1) displaying wide range of facial & body gestures reflecting emotions

Item 2) quickly finding tears in eyes

Item 3) showing emotions very early (only after 20 seconds)

Item 4) announcing that the performer is favorite contestant

Item 5) highly trying to be supportive and nice to the performer

Character 2:

Item 6) showing an even and calm rhythm

Item 7) showing not much emotion physically

Item 8) first commenting on facts about performer's appearance

Item 9) making careful attention to the details about performer

Item 10) referring to how things should be done in order to win

Item 11) referring to how performer should appear on stage

Item 12) showing emotions verbally

Character 3:

Item 13) standing up and showing physical emotions

Item 14) announcing that the performer is a star

Item 15) not much saying

Item 16) calling everybody to stand up on feet

| | | | | | | | | | | | | | | | | |
|---------|---|-------------|-------------|-------------|-------------|---|-------------|-------------|-------------|-------------|---|-------------|---|-------------|-------------|-------------|
| | <div><div></div>The item was referred</div> | | | | | <div><div></div>Controversy over the issue was observed</div> | | | | | <div><div></div>Opposition over the issue remained unsolved</div> | | | | | |
| Group C | Emotional, Intuitive, Humanistic | | | | | Rational, Fact-based, Structured, Detailed | | | | | | | Holistic, Flexible, Emotional | | | |
| | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Group B | Emotional, Intuitive, Humanistic | | | | | Rational, Fact-based, Detailed | | | | | | | Holistic, Flexible, Emotional | | | |
| | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Group A | Emotional, Intuitive | | | | | Rational, Fact-based, Structured, Detailed | | | | | | | Holistic, Flexible, Intuitive, Risk taker | | | |
| | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| | Item 1 | Item 2 | Item 3 | Item 4 | Item 5 | Item 6 | Item 7 | Item 8 | Item 9 | Item 10 | Item 11 | Item 12 | Item 13 | Item 14 | Item 15 | Item 16 |
| | Character 1 | | | | | Character 2 | | | | | | | Character 3 | | | |

Figure 48. Group results from experiment No.2

4.3.1 EXPERIMENT GROUP A

This group was the IDBM students. After the video, active participants decided that character 1 is very emotional and she is also intuitive. Moreover, they suggested that her tendencies are more toward downright according to MPM, which is in fact similar to Emotional-Physical personality dynamic that was introduced during the session as an example. Character two was believed to be very rational, very fact-based, structured, and detailed. Therefore overall direction of tendencies was toward left –perceived similar as Physical-Mental type. Character 3 what a bit harder to say, since he left less information than other characters in the video. Anyhow, he was perceived as holistic, flexible, intuitive, and to some extent risk-taker –similar to Emotional-Mental personality dynamic. The table above shows how much participants were referencing the items and if there had been controversy. Participants' comments were such as:

(Character 1)

"She was very emotional... that she was almost crying"

"I think she was also intuitive because... she didn't talk about facts as the other guy did"

(Character 2)

"He had a... structured mind"

"He was very rational and far from being emotional or intuitive"

"He pointed at clear facts so I believe he is very fact-based" and "detailed but factual"

"I would say he is like green (toward left)..."

(Character 3)

"He is to the right (side of frame). Hosselhoff is like intuitive and risk-taker"

"But he didn't say much... no facts, no details, no structure"

"He initiated an action at the end... just an idea... he is to the right-upper"

4.3.2 EXPERIMENT GROUP B

This group was the PDP students. After the video, they decided that character 1 is very emotional, very humanistic, and intuitive. In addition, they suggested that her tendencies are more toward right and a bit toward down (according to MPM) like the example of Emotional-Physical personality dynamic, which was given earlier within that session. Character 2 found to be very rational, very fact-based, very structured, and very detailed. He was also found to be both objective and subjective by two different participants and therefore group did not agree that one is much preferred over the other. Character 3 was identified as holistic, flexible, and to some extent emotional. This placed his tendencies more toward right. Examples of given comments are:

(Character 1)

"She was so sensitive and emotional..."

"Quickly got excited... but I don't know (I think) she (is) intuitive"

"She was also humanistic... so supportive and giving hope"

(Character 2)

"Obviously rational and objective"

"Attention to details about her dress... and then formulating them in facts"

"He seemed aloof, but he was nice and was trying to help... I feel he was also subjective because for him it was important how to do it to achieve the objective"

(Character 3)

"He stood up... showing his emotions but I would say he is more up (toward up-right) as being holistic and flexible"

"He didn't say any fact or detail, just"

"He didn't pay much attention as (the other) guy did"

4.3.3 EXPERIMENT GROUP C

This group was the ITP students. After the video, active participants concluded that character 1 is very emotional, very intuitive, and humanistic. They also suggested that her tendencies are more toward down-right (according to MPM) and similar to Emotional-Physical personality dynamic. Character 2 was suggested to be very fact-based, very detailed, and also rational. There were two controversy discussions; one was about the rate of being rational over emotional, and the other was on the level of being objective or subjective. Objective or subjective issue was then solved through discussions and reached the conclusion that none is much preferred over the other. However, for the issue related to the level of being rational, one of the participants believed that character 2 is also emotional but shows it in different ways (i.e. verbally). The majority tried to convince her that even by considering what she says, character 2 is still very rational. This discussion seemed being left unresolved for the single (visible) opponent. For character 3 it was a bit challenging for this group as well, due to lack of sufficient tangible facts in the video. Though, the group decided that he is holistic, very flexible, and also to some extent emotional. And yet decided that his tendencies are more toward upper-right. Some of comments were as followings:

(Character 1)

"Showing many emotions and facial expressions"

"Emotional! ...Obviously very emotional"

"Very intuitive... because of gut feeling"

(Character 2)

"Very rational and linear..." and "...he was not emotional at all"

"But, he was emotional... he just didn't have mimics... but he said it nicely"

“Very detailed... paying attention to details of her shows and dress”

“He was objective or subjective? ...He was objective in comments but also commenting on subjective issues...”

“Details were very important for him...” and “...he talked very structured and fact-based”

(Character 3)

“He did something at the end... I guess... he is very flexible, not structured”

“He is to the right... going loud, suddenly something (uneven rhythm)”

“He was a bit emotional as well... not like the woman, but (to some extent)”

“Although he was emotional but he... is more toward up... did not pay attention to details and I think (he) was holistic”

5. DISCUSSION

This chapter presents the final conclusions including suggestions in regards of applying MPM. The arguments are based on both the literature analysis and empirical researches noted in this thesis book. The findings will be taken forward by discussing them in the context of theoretical knowledge. Furthermore, limitations are highlighted, the studies are evaluated, and suggestions for further researches are presented.

As noted earlier, this thesis has been part of an ongoing research project. The purpose of this research project is to extend on the existing researches in the (esp. practical) area where cognitive diversity and education meet. Hence, as very first steps, this thesis has been specifically focused on models for providing teachers a better solution if possible. Furthermore, the thesis investigated about the new proposed model (MPM) in terms of validity and functionality. Therefore, the main questions at this stage of research project were the followings:

- Do educators need some kind of model like MPM?
- Is MPM a valid model?
- Is MPM functional?

Provided that, these studies have so far achieved acceptable results. In addition, need for further studies was acknowledged and put into consideration for what is to come through the overall research project.

5.1 OPPORTUNITY FOR EDUCATORS

Findings in the light of conducted research (by generalization) suggest that educators in the contexts similar to the ones that were interviewed need a systematic approach for their students to learn about different thinking styles

and preferences. Students would benefit from such trainings through their collaboration during the course and more importantly, through their future work and collective efforts. For this reason, they may take and utilize some of the existing tools and frameworks like for example any of those that are briefly describes in theoretical background. As though, this thesis contributes to those educators by introducing those models –if unfamiliar– and in addition, put those models into a table for quick comparison according to their actual needs, which were found during the empirical research (by interviews).

*The manager of
future will be
simply a
learning guide.”
~Peter Drucker,
father of
management*

5.1.1 CONSIDERING COGNITIVE DIVERSITY

Importance of understanding diversity was highlighted in this research through theoretical part. Also, as far as it was found from the interviews, there were three aspects of diversity to be most important: Cultural, Discipline, and Cognitive. Although, in several cases it was not directly mentioned about the term ‘cognitive diversity’ but the analysis showed that many attributes they referred to —as being important— were in fact attributes that relates to cognitive diversity. Attributes such as: mental model, different ways of doing things, communication styles, decision-making, etc. Although, some of these may overlap with the other, yet role of cognitive diversity was found clearly to be important. To remind, cognitive diversity is about ‘preferred way of thinking’ (Sternberg, 2001) and concerns differences among people with regards to how they process information, rather than what they bring to a group due to their background, education, and so on (e.g. Harrison & Bramson, 1984; Mayer, 1983). Interestingly, except cognitive diversity, much of the other aspects that educators raised as important (cultural & discipline) are more like surface-level type of diversity, which is easier to identify (Schilpzand, 2010). It was only cognitive diversity that was more like deep-level type and therefore more challenging to be identified. Perhaps, this is one reason that why cognitive diversity has been mostly left out from practical consideration in those programs. This claim is actually supported by some of outcomes from the interviews. For example, it was said that: “this is relevantly undeveloped in

our university” or “we don’t have relevant data (information) for that” or “we don’t have (any) expert (for that)”. This is while, it has been suggested that deep level diversity is more likely to have positive effect on team’s outcome compare to surface level i.e. cultural diversity that tends to affect a team negatively (Schilpzand, 2010).

Moreover, if we look at the mental preferences profiles in fourth chapter, in the second section (or check appendix G) it can easily be found that our thinking preferences can be different within a particular discipline and quite often we can find people with certain thinking preferences far away from what is typically expected from people in a particular field or discipline. Therefore, the notion that disciplines reflect how we think is again proven not to be truly correct and this is what some people are already aware of. For example, during the interviews it was mentioned that: “It’s a question of resolution if you have a rough resolution you can say that all engineers tend to think alike. Which is not true all the way, but there are certain similarities between all engineers”. Nevertheless, these must be enough to raise the importance of cognitive diversity in education context. Despite the skeptical opinions and claims that it is a sensitive topic and perhaps we should hold initiating actions on that, it sounds more reasonable to begin learning this phenomenon. As Senge (1997) argues, people are already stereotyping most of the time, so it is the question of providing better indicators and provide better understanding to improve their judgments. As it was also found from interviews, all cases demanded the effort to increase students’ awareness over the topic and improve their understanding. This learning would be totally in line with the theory of ‘learning organization’ by Senge (1990), since it can provide better ability to for adaptation to the environment (which means both internal and external).

*“Coming
together is a
beginning;
keeping
together is
progress;
working
together is
success.”
~Henry Ford,
industrialist*

Education about cognitive diversity is relatively a quite new subject. Unfortunately, learning how to work productively together and understand one another in deeper sense is not receiving much attention, typically (e.g. Senge, 1997; Kichuk & Wiesner, 1997). However, these mean if educators find a

chance to better response to this phenomenon, they shouldn't hesitate. Actually, results from the interviews also proved that they would be willing to apply a knowledge in that realm if found to be possible. And they seemed quite open to try worthy methods.

"The role of teacher is to facilitate learning and that's it."
~Sir Ken Robinson

5.1.2 COMPARISON OF MODELS

Thinking about models, tools, and frameworks is actually important as it can provide opportunity to select from easier, systematic, and studied methods for educational purposes. Consequently, this subsection presents a comparison of some of those models (figure 49), which have been also noted in the theoretical background, by relating their features to the founded needs.

| | | <div> <div>✓ Being recommending</div> <div>— Insufficient information</div> <div>✗ Negative / does not meet the item</div> <div>○ Positive to some extent</div> <div>● Positive / meets the item</div> </div> | | | | | | | |
|------------------------------------|--|---|------------|------------|-------------|-----------------|----------------|-------------------|----------------------|
| | | * Positive if by a day workshop | | | | | | | |
| Main focus of Model | | Personality | Team roles | Team roles | Personality | Thinking Styles | Thinking Modes | Human Functioning | Thinking Preferences |
| Convenient access for end-user | | ✗ | ✗ | ✗ | — | — | ✗ | ✗ | ● |
| Main/specific tool provided | | ● | ● | ● | ● | ✗ | ● | ✗ | ● |
| Low risk without administration | | — | — | — | — | — | — | ● | — |
| Visualizer | | ✗ | ○ | ○ | ● | ✗ | ● | ✗ | ● |
| Not a measurement tool | | ✗ | ✗ | ✗ | — | ✗ | ✗ | ● | ● |
| Promotes no better style | | ● | ● | ● | ✗ | ● | ● | ● | ● |
| Promotes independent use | | ✗ | — | — | — | ● | ✗ | ● | ● |
| Be practical for team context | | ● | ● | ● | — | — | ● | ● | ● |
| Can be used in short time* | | ✗ | — | — | ● | ● | ● | — | ● |
| Not put into boxes | | ✗ | ✗ | ✗ | ● | — | ✗ | ○ | ● |
| Gives awareness & displays variety | | ● | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Understanding thinking diversity | | ● | ✗ | ○ | ✗ | ● | ● | ● | ● |
| Educators demand | | Myers-Briggs | Belbin | TMS | BIG 5 | CSA | Whole Brain | Human Dynamics | MPM |

Figure 49. Model comparison in regards to educators' need

Since both theoretical and empirical studies for this thesis found that learning about thinking diversity is important, the models that do not help in understanding it, are off the table of recommended models by this thesis book. One aspect that was repeatedly emphasized by interviewees was that the model or method they want to use should not put people into boxes. This indicator leaves only few of the models on the table of proper tools. These models are: CSA, Whole Brain, Human Dynamics, and MPM. CSA is a two-dimensional model that measures dimensions Wholist-Analytic and Verbal-Imagery. According to the interviews, these models with one or few dimensions are not desired. One of the interviewees specifically mentioned that such models are not what we want. More on that, the practical use of this model e.g. for teams or students was not clear for this study. Besides, there are other models that deliver much more than that unless educators prefer to use this particular model for a specific reason that this study was not able to identify.

Human Dynamics, and MPM are so far are the only recommended models for educators by this thesis. However there are some key features about each that perhaps teachers would like to consider. For example, Human Dynamics provides a very useful framework and is less like putting people into boxes. However it lacks a main tool that would help people with their identification process and also lacks usage of visual means that would support learning. Human Dynamics is not yet accessible as conveniently as MPM—that is meant to be. Both knowledge and examples from Human Dynamics and Whole Brain (or perhaps some other models) can be used through MPM, while in addition it provides almost all features that found by this thesis to be educators' need. It can help in understanding thinking diversity, raise the awareness and project the possibility of variety of styles, no 'putting into box', can deliver knowledge in enhanced time, is technically usable by student in various contexts (as will be discussed later in this chapter), it is not relied on other means i.e. questionnaire, it promotes no 'better style' by showing each has its own dark and bright sides, and it is not a measurement tool, but it visualizes meaning.

MPM in compare to Human Dynamics framework seems to be more usable (referring to section 1.1) by students; it seems easier to use, more accessible, and more convenient. However, these claims and many other aspects about this model yet require further research. To give one more example, it is not scientifically determined yet whether use of MPM independently by users without administration is harmless. In any case, try of MPM by educators would provide more opportunity for further research and analysis.

5.2 EVALUATION OF PROPOSED MODEL

Results achieved by testing validity and functionality of MPM, suggested good results for this model. However, the particular studies do not seem to be sufficient in order to accurately rate MPM in terms of validity and functionality. But, they have been good hits for the beginning and they are perceived as carrying successful results for the overall research project.

5.2.1 EVALUATION OF VALIDITY

Although conducted experiments concluded that MPM is a valid model, but this study suggests further researches. This is because, first of all, the test for validity can be criticized by being relied on validity of Human Dynamics theory. For example, there had been three cases (out of 31) that were displaying unclear (yet cannot be judged as wrong) results when the profile has been showing at least two areas of tendency. This is while, according to the method, the idea has been to relate the areas within the frame of MPM, to personality dynamics of Human Dynamics. This implies sort of creation of boxes within the circle to literally drag individuals' tendencies to each one of them. This has been already argued to be not the intention of MPM. Despite the fact that (according to Seagal, 1997) there can be nine dynamics and they found the emphasized five dynamics in dominant, it could be also a positive point that some people can have tendencies in between two —as exact

known— personality dynamics, whereas some people have just slightly more tendency toward one of them rather than the other.

In any case, that requires more research to clarify whether this phenomenon costs for the value of MPM or in contrast, adds to it. This has been actually very interesting for this research project. For instance, by looking at the case No.27 and compare it to the cases No.12 or No.15, it can easily be found that it is actually delivering some useful insights about their differences, while they all have the same preferred activity rhythm. For case No.27, it reflects less strength in his tendencies for sacrificing an aspect for getting more of the other. If this is the same case as what Herrmann (1996) pointed that a minority (about 2.5%) have been found with no strong dominated thinking style in particular, then this person is one of that minority that Herrmann suggested they may show more hesitation in decision-making in situations i.e. management. But, he also suggested that they could go easier with the way of other people. However, his activity rhythm and explanations for how he would do the (given task) project was checked again, but no specific fact was found to indicate his differences with the other cases (No.12 & No.15).

Second concern regarding the validity study, is with regards to the contradictory results found for case No.08 and case No.11. In case No.08, the MPP shows that tendencies are highly toward bottom-right, whereas it is expected by its activity rhythm to represent tendencies toward upper-right. The key is in the objective-subjective scale. As Seagal (1997) suggests, an Emotional-Mental is objective and she also calls them Emotional-Objective, while an Emotional-Physical is subjective (also called Emotional-Subjective). Case No.08 represents high preference for being subjective. This case or similar cases need to be studied through future researches to find out what causes this phenomenon; if it is caused by misunderstanding and by misinterpretation of guiding explanations (at the bottom of given forms), or if it is in fact about special cases that either concerns validity of MPM or reliability of what is used from Human Dynamics for the experiments. Unfortunately, this study was unable to do further investigation with the participant to analyze it

deeper. This is pretty much the same for case No.11, although it may also look like that it is reflecting tendencies more toward upper-right (as is expected by that type of activity rhythm), but it actually shows subjective tendency and tendencies toward lower part are stronger in overall. It would be interesting to also figure out if this problem would be solved if training session goes beyond a few hours workshop and students learn more about mental preferences.

5.2.2 EVALUATION OF FUNCTIONALITY

Experiment No.2 resulted that MPM can be functional in practice. Clearly, some of the participants were able to apply the model and identify subjects' preferences by referring to the key factors in the model. This means that the method of the experiment by usage of MPM was able to help those students identify someone else's thinking preferences. And this whole process has occurred in less than three hours (or even less) –achieving a successful milestone for current research project.

The first thing that may be questioned about this experiment is that why the experiment did not collect the responses from the individuals after the video to determine the functionality? To answer correctly, the initial objective for that method noted in the first chapter, has to be reviewed. The objective was to understand if the proposed model is usable for educators. Therefore, it went through a simulation of a learning class. Some educators have also verified this type of procedure during interviews that having a group activity, learning together, and then having discussions to reach a common understanding is what they prefer to have. It turns out, that this method has been a better choice than the other way after all.

*"If there is
no struggle,
there is
no progress."
~Fredrick
Douglass,
social reformer
& orator*

However, there were some few numbers of people who had a different opinion about the preferences of the target subjects, but those had been resolved through discussions, except one case. It should be noted that, it has

been inherently important for this research project to consider all the individual cases. In that particular case, the participant did not seem to reach an agreement with the others and also did not continue the discussion. Perhaps, by considering an important element in learning, which is time, it could end differently —if there had been more time available to discuss the matter and if the trainer (or facilitator) could intermediate more (limited due to the risk of achieving biased results). Anyhow, that specific case alone does not seem to be related directly to the functionality of MPM, as it would more concern the training approach.

5.3 LIMITATIONS

It has been said that limitations begin by our own minds and way of thinking. Of course, it would (potentially) make much difference if this thesis had been conducted through a team. There have been limitations concerning conducted studies. As being part of an ongoing research project, this thesis was confined to contribute to the educators and student in learning about thinking diversity. There has been an assisting tool developed within this research project and was proposed as a model to help the matter. But there are still many questions regarding this model that need to be answered and yet, the tool and methods may even need further improvements.

This thesis has been a small step due to time constraints related to the master's thesis work, even though it has already taken longer than a typical master thesis. Hence, generalizations of findings beyond the research setting have the possibility to be incorrect.

One more key issue had been related to the accessible network of the researcher. Perhaps, it could affect better if the researcher was more in contact with advanced scholars, or professionals in the related fields of this research project. Nevertheless, the success of methods used in the thesis, had been depending a lot on the researcher. The subjective interpretation of

the collected empirical data by the researcher possibly has influenced the findings and may have resulted in inaccurate insights. Unfortunately, the research was limited to one researcher at the time.

5.4 FUTURE OF PROPOSED MODEL

The studies have gone some way towards enhancing our understanding of thinking diversity and thinking preferences. It also contributes to a growing body of literature on the area calling for both education methods and practices of cognitive diversity. Analysis of findings has shown that using MPM provides an opportunity for students to learn more about different tendencies in thinking process and furthermore they can reuse it and improve their learning through exercises with sensitive listening and observations. MPM also allows the interested teachers to add leaning about thinking diversity in their curriculum and respond to it in an elegant way. Learning methods nowadays (at least in some programs) seem to be appreciating group learning and group discussions more than before. Being so, it seems beneficial to apply methods similar to what was applied through this thesis. After all, a good thing about MPM is that it follows the philosophy of bottom-up approach and therefore empowers students to apply the knowledge themselves rather than waiting for another, expert, or a higher (managerial) level, to tell them how it works.

5.4.1 PRACTICAL IMPLICATIONS

The method used for the conducted experiments in regards to learning about thinking preferences, can be applied to learning contexts for similar learning aims, elsewhere in the world. MPM, taken together with its whole philosophy and features promotes self-development and appreciation of differences. Therefore we can improve our interactions with one another respectfully, as the demand for this has been long emerging. This again refers to what Seagal (1997) argued: that despite

*"The whole point of education is to get people to learn."
~Sir Ken Robinson*

our countless advancements, “in our collective endeavors and basic interactions with one another, we so often seem to fail”.

There are several practical implications for MPM. Some of its applications as a tool are hereby proposed:

- Assist learning and through providing numerous examples
- Provide guidance for self-awareness & self-development
- Visualize thinking preferences
- Profile (independently*) individuals/groups for improved speculation
- Profile (dependently) individuals/groups for some specific analysis
- Provide guidance to strategize communication or presentation
- Provide guidance for learning & teaching strategies for a specific case
- Identify differences required for collective efforts i.e. startups
- Guide for team building
- Guide for management & leadership roles
- Guide for organizational development in regards to human resource

Last but not least, the experiment No.2 of this thesis, which was conducted in the context of a real-world learning environment, showed that it was a relatively good start for students pursuing to understand thinking diversity. Therefore, this thesis suggests making MPM available to other similar students, and then letting them have enough time for discussions in relation to their findings (sharing what they learned etc.).

*“Students’
questions are
the seeds of
real learning.”
~Ramsey
Musallam,
inspiring
chemistry
teacher*

5.4.2 RESEARCH SUGGESTION

There are quite many possible avenues for the further research on MPM. This section is calling for supplementary research to extend the body of

* Dependently is by asking target people to profile themselves, while independently is to profiling without engaging them.

knowledge about MPM. The following non-exhaustive list contains interesting topics to be pursued in the next steps of the research project:

1. Evaluating the functionality of MPM during individual practice – instead of group-exercise, which was conducted for this thesis.
2. Investigating what caused unexpected results found from MPPs (like what was found in case No.8 and case No.11).
3. Is usage of MPM more effective and adaptable for those with particular thinking styles over others?
4. To what extent can the functionality of MPM be affected by variations of the style of facilitators during the learning sessions?
5. Does a quantitative data gathering of MPPs, uncovers any unexpected form of profile? Would it still confirm the validity of MPM?
6. Is correlation of MPM with other related models with controversy?
7. What can MPP of a group or organization show us? And how can it help them?
8. What do MPPs of individuals in specific fields of study reveal?
9. How can MPM go online? Or be used within a mobile app?
10. Once learning for awareness has occurred, what are the best ways to reach further learning in order to achieve better results in practice (behavior)?
11. Does knowing about MPM affect performance in a positive way?
12. Do differences in extreme contrast raise negative effects even though the user has learned about it through MPM in prior?
13. Can MPM add value to the current settings of innovation (or fuzzy front-end) project management?
14. How much may an individual's preferences vary in different contexts?
15. How are results affected when two people interacting are familiar with thinking diversity in comparison to when only one of them has that knowledge? And how is it in comparison to when none of them has it?

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APPENDIXES

A) The 16 MBTI Types

(From MBTI Basics on The Myers & Briggs Foundation's website)

ISTJ

Quiet, serious, earn success by thoroughness and dependability. Practical, matter-of-fact, realistic, and responsible. Decide logically what should be done and work toward it steadily, regardless of distractions. Take pleasure in making everything orderly and organized – their work, their home, their life. Value traditions and loyalty.

ISFJ

Quiet, friendly, responsible, and conscientious. Committed and steady in meeting their obligations. Thorough, painstaking, and accurate. Loyal, considerate, notice and remember specifics about people who are important to them, concerned with how others feel. Strive to create an orderly and harmonious environment at work and at home.

INFJ

Seek meaning and connection in ideas, relationships, and material possessions. Want to understand what motivates people and are insightful about others. Conscientious and committed to their firm values. Develop a clear vision about how best to serve the common good. Organized and decisive in implementing their vision.

INTJ

Have original minds and great drive for implementing their ideas and achieving their goals. Quickly see patterns in external events and develop long-range explanatory perspectives. When committed, organize a job and carry it through. Skeptical and independent, have high standards of competence and performance – for themselves and others.

ISTP

Tolerant and flexible, quiet observers until a problem appears, then act quickly to find workable solutions. Analyze what makes things work and readily get through large amounts of data to isolate the core of practical problems. Interested in cause and effect, organize facts using logical principles, value efficiency.

ISFP

Quiet, friendly, sensitive, and kind. Enjoy the present moment, what's going on around them. Like to have their own space and to work within their own time frame. Loyal and committed to their values and to people who are important to them. Dislike disagreements and conflicts, do not force their opinions or values on others.

INFP

Idealistic, loyal to their values and to people who are important to them. Want an external life that is congruent with their values. Curious, quick to see possibilities, can be catalysts for implementing ideas. Seek to understand people and to help them fulfill their potential. Adaptable, flexible, and accepting unless a value is threatened.

INTP

Seek to develop logical explanations for everything that interests them. Theoretical and abstract, interested more in ideas than in social interaction. Quiet, contained, flexible, and adaptable. Have unusual ability to focus in depth to solve problems in their area of interest. Skeptical, sometimes critical, always analytical.

ESTP

Flexible and tolerant, they take a pragmatic approach focused on immediate results. Theories and conceptual explanations bore them – they want to act energetically to solve the problem. Focus on the here-and-now, spontaneous, enjoy each moment that they can be active with others. Enjoy material comforts and style. Learn best through doing.

ESFP

Outgoing, friendly, and accepting. Exuberant lovers of life, people, and material comforts. Enjoy working with others to make things happen. Bring common sense and a realistic approach to their work, and make work fun. Flexible and spontaneous, adapt readily to new people and environments. Learn best by trying a new skill with other people.

ENFP

Warmly enthusiastic and imaginative. See life as full of possibilities. Make connections between events and information very quickly, and confidently proceed based on the patterns they see. Want a lot of affirmation from others, and readily give appreciation and support. Spontaneous and flexible, often rely on their ability to improvise and their verbal fluency.

ENTP

Quick, ingenious, stimulating, alert, and outspoken. Resourceful in solving new and challenging problems. Adept at generating conceptual possibilities and then analyzing them strategically. Good at reading other people. Bored by routine, will seldom do the same thing the same way, apt to turn to one new interest after another.

ESTJ

Practical, realistic, matter-of-fact. Decisive, quickly move to implement decisions. Organize projects and people to get things done, focus on getting results in the most efficient way possible. Take care of routine details. Have a clear set of logical standards, systematically follow them and want others to also. Forceful in implementing their plans.

ESFJ

Warmhearted, conscientious, and cooperative. Want harmony in their environment, work with determination to establish it. Like to work with others to complete tasks accurately and on time. Loyal, follow through even in small matters. Notice what others need in their day-by-day lives and try to provide it. Want to be appreciated for who they are and for what they contribute.

ENFJ

Warm, empathetic, responsive, and responsible. Highly attuned to the emotions, needs, and motivations of others. Find potential in everyone, want to help others fulfill their potential. May act as catalysts for individual and group growth. Loyal, responsive to praise and criticism. Sociable, facilitate others in a group, and provide inspiring leadership.










ENTJ

Frank, decisive, assume leadership readily. Quickly see illogical and inefficient procedures and policies, develop and implement comprehensive systems to solve organizational problems. Enjoy long-term planning and goal setting. Usually well informed, well read, enjoy expanding their knowledge and passing it on to others. Forceful in presenting their ideas.

B) The 9 Belbin Team Roles

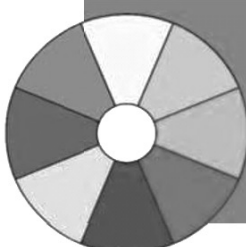
BELBIN®

Team Role Summary Descriptions

| Team Role | Contribution | Allowable Weaknesses |
|---|--|---|
| Plant  | Creative, imaginative, free-thinking. Generates ideas and solves difficult problems. | Ignores incidentals. Too pre-occupied to communicate effectively. |
| Resource Investigator  | Outgoing, enthusiastic, communicative. Explores opportunities and develops contacts. | Over-optimistic. Loses interest once initial enthusiasm has passed. |
| Co-ordinator  | Mature, confident, identifies talent. Clarifies goals. Delegates effectively. | Can be seen as manipulative. Offloads own share of the work. |
| Shaper  | Challenging, dynamic, thrives on pressure. Has the drive and courage to overcome obstacles. | Prone to provocation. Offends people's feelings. |
| Monitor Evaluator  | Sober, strategic and discerning. Sees all options and judges accurately. | Lacks drive and ability to inspire others. Can be overly critical. |
| Teamworker  | Co-operative, perceptive and diplomatic. Listens and averts friction. | Indecisive in crunch situations. Avoids confrontation. |
| Implementer  | Practical, reliable, efficient. Turns ideas into actions and organizes work that needs to be done. | Somewhat inflexible. Slow to respond to new possibilities. |
| Completer Finisher  | Painstaking, conscientious, anxious. Searches out errors. Polishes and perfects. | Inclined to worry unduly. Reluctant to delegate. |
| Specialist  | Single-minded, self-starting, dedicated. Provides knowledge and skills in rare supply. | Contributes only on a narrow front. Dwells on technicalities. |

C) Team Management Wheel

TMS System



INTRODUCING THE TEAM MANAGEMENT SYSTEM

The **Team Management System** is a suite of management development products. Each instrument has a questionnaire for completion which is then analysed by computer to produce a Profile report. Each Profile is written in positive, managerial language which can be used with teams or individuals. The positive language and practical development advice means the profiles are well received by individuals and teams – this makes the feedback process very productive for consultants or HR professionals.

The **Team Management Wheel** is a simple, visual model, which shows the work preferences found in high performing teams. The centre of the wheel is the area for the key linking skills that individuals need to use to successfully work as a team. It has numerous practical applications in the workplace ranging from task achievement to strategic planning – it is also used as the foundation for the Team Management Profile.

Our accreditation workshops cover the three levels of the **Workplace Behaviour Pyramid** – Preferences, Risk Orientation, and Values.

THE TEAM MANAGEMENT INDEX (TMI)

A ten-page feedback report written in down to earth managerial language focusing on personal work preferences and strengths and the need to build balance in the Team Management Wheel.

THE OPPORTUNITIES ORIENTATION QUOTIENT (QO2)

Adding to this framework is the Opportunities Orientation Quotient. A seven page profile that highlights the effort people put into seeing opportunities at work. Individuals are able to understand their own and other team members' risk orientation and receive suggestions for improvement.

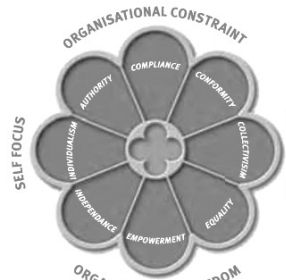
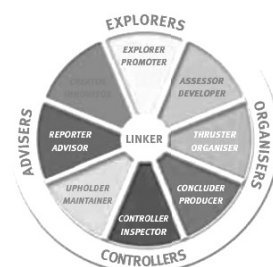
WINDOW ON WORK VALUES (WoWv)

The WoWv model identifies eight core value types which describe the major components of value driven behaviour in the workplace. The 64-item questionnaire and resulting 3000 word personal profile describes the respondent's work value patterns. This feedback can be used to compare individual work values with those of the organisation. Values alignment can improve team and individual effectiveness and performance in the work environment.

HOW CAN THE TEAM MANAGEMENT SYSTEM HELP YOU?

People are clearly the most vital business resource in any organisation. If an organisation is to achieve and maintain a competitive advantage, high productivity and effective performance, it is essential that it makes the most of its "people resource".

TMS provides a practical framework which can help people to identify their strengths and weaknesses, both as individuals and team members and in relation to whole team performance. This enables them to tackle problems more effectively by maximising strong points and working on improvements.



Check our Website www.tms.co.nz

or email us at team@tms.co.nz

or call us on 09 836 5317

D) Strategies for learning & memory

Figure 11-6. Instructional Strategies for Improved Learning Design

| | | |
|--|--|----------|
| A | Lectures Facts Research findings Higher order reasoning Critical thinking Case studies, reference books, readings Use of experts Applied logic Metacognition Theories Technical approaches | D |
| B | Brainstorming Discovery learning Metaphors Active imagination Creativity Illustrations, pictures Simulations Mindmapping, synthesis Holistic exercises Storyboarding Visualization, mental pictures | C |
| Outlines Quizzes Practice Checklists, timelines Sequenced learning Policies, procedures Organization, summaries Who, what, why, when, where Exercises with steps Structured problem solving Clear examples, case studies, references | Cooperative and team learning Group discussions, chat Role playing, drama Body language Sharing personal experiences Listening and sharing ideas Writing, storytelling, and scenarios Auditory, musical, and rhythmic Physical, kinesthetic activities Interviews | |

Source: Herrmann International, © 1982-2007. All rights reserved. Used with permission.

Figure 11-2. Memory Strategies the Whole Brain Way

| | |
|---|--|
| Study Memorization Mnemonics Logical associations | Visualization Creating metaphors Creative mnemonics Visual association |
| A "capture plan" Writing it down, lists Categorization techniques Time management techniques | Emotional engagement and associations Link to music Use of rhythm Sharing with another person |

Source: Herrmann International, © 1982-2007. All rights reserved. Used with permission.

E) Herrmann International poster set



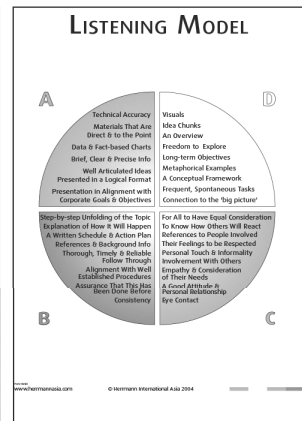
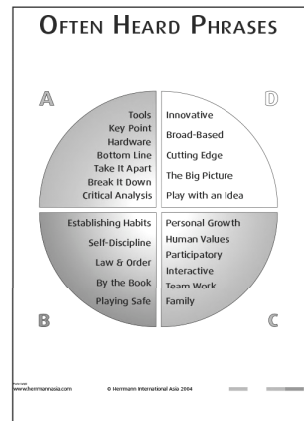
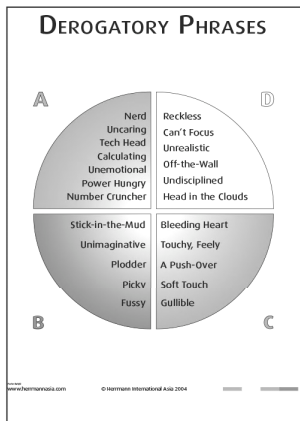
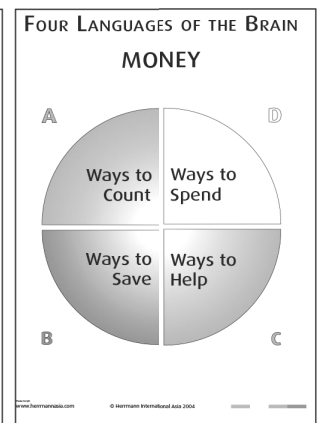
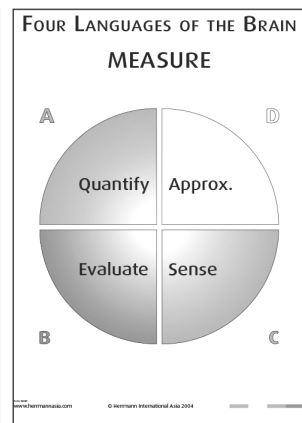
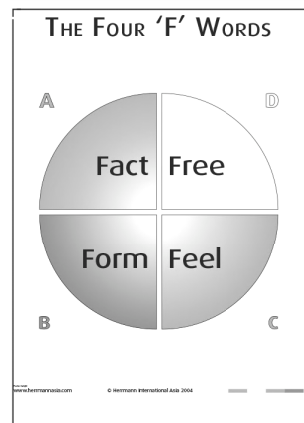
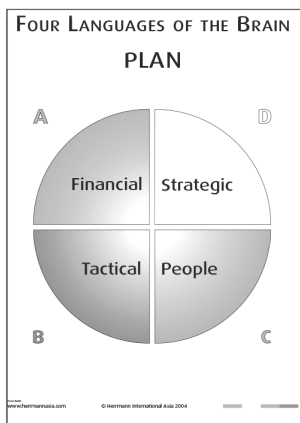
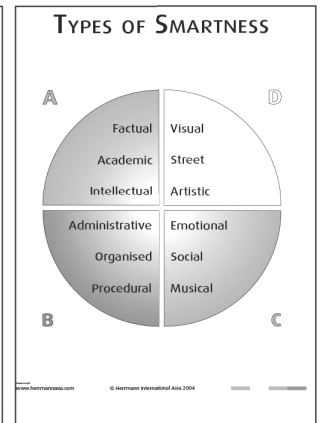
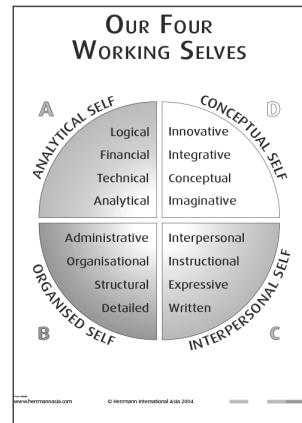
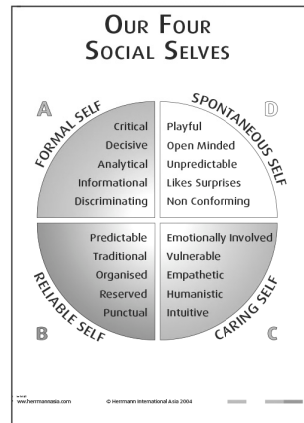
PO Box12801, Queenswood, 0121. South Africa

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Poster Set No 2



better results through better thinking

Africa / Americas / Asia / Australia / Europe

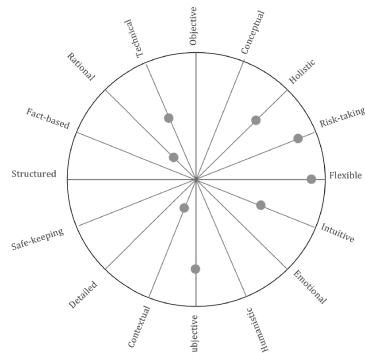
F) Early questionnaire

Only used during quick prototypes (2011) and never afterwards.

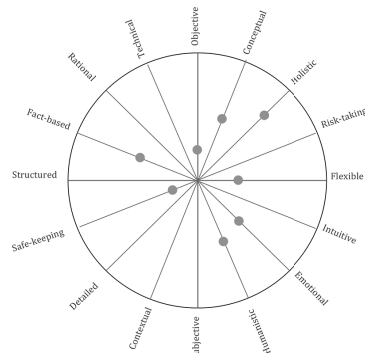
| Name: | | Background & Occupation: | |
|---|---|--------------------------|--|
| In each line below, you have to contribute the amount of 10 to the items, and write them inside the blanket. | | | |
| 1 | I tend to follow/create structure in my work/life. Structures help me to feel and work better. | <input type="checkbox"/> | I am very flexible. I can work in unstructured environments easily. I may even break structures. |
| 2 | It is easy for me to take risks and try different ideas while the results are not clear. | <input type="checkbox"/> | I try to keep safety and lessen risks. I need to know the results in advance; So I may postpone actions. |
| 3 | I can and I like to see details and remembering them. | <input type="checkbox"/> | I tend to look at the big-picture rather than details. Seeing & remembering detail is not that easy for me. |
| 4 | I prefer to concern about conditions and imagine the consequences of an issue. | <input type="checkbox"/> | I prefer to apply what I know to a current issue. |
| 5 | For me, the way that I am going to achieve something is much more important than the objective. I will reconsider the objective if necessary. | <input type="checkbox"/> | For me, the objective is much more important than how I am going to achieve it. I may change the procedure to achieve the objective. |
| 6 | I explain things technically. I have technical approach to see how things work. | <input type="checkbox"/> | I highly consider people in explaining things. People are highly important to me. |
| 7 | I am strongly emotional. Being just rational is not fun. | <input type="checkbox"/> | I am highly rational. Being logical is much more acceptable than emotional in taking actions. |
| 8 | I am very fact-based & quantitative. I prefer to talk base on facts or numbers. | <input type="checkbox"/> | I am very intuitive and not quantitative. I can write or act with sense-making. |

Notes:

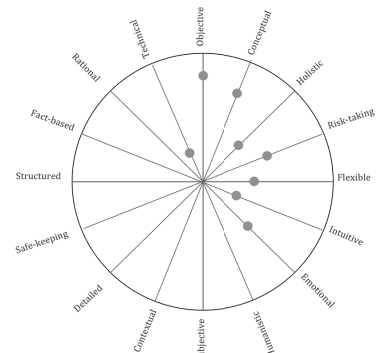
G) MPM sample profiles



*Mechanical Engineering Professor
Male*



*Communication Ecosystem, MSc
Male*



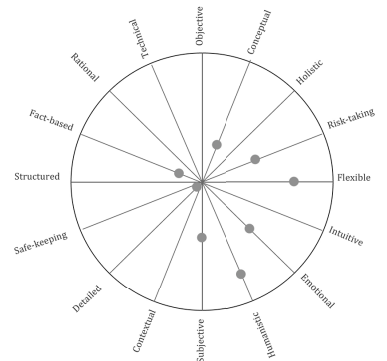
*Aerospace Engineering, MSc
Male*



*Wood Engineering, PhD
Female*



*Education, MA
Female*

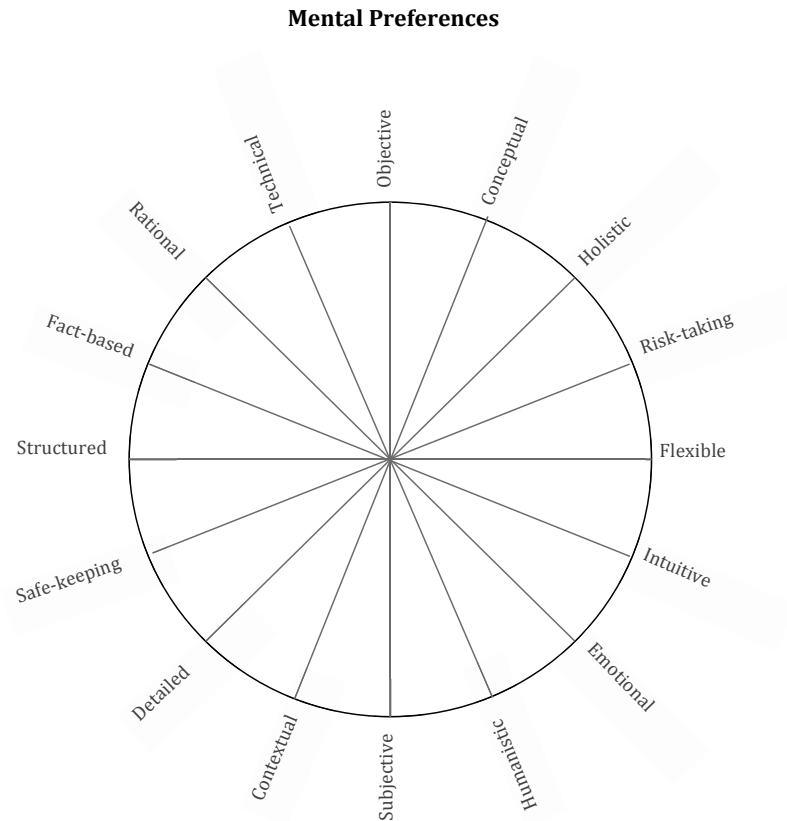


*User-centered Product Development
Male*



*Information Technology, MSc
Female*

H) MPM form



Factors

Rational | *strength of reasoning and expressing it*
 Emotional | *strength of feeling and expressing it*

Fact-based | *being in need for facts; numbers, tangibles, sources, etc.*
 Intuitive | *being able to acquire knowledge without inference like aesthetic abilities*

Structured | *being highly in need for having/creating frameworks, structures, or rules*
 Flexible | *being able to work in unstructured environments, or even break structures*

Safe-Keeping | *trying to lessen risks and avoid quick decisions for stabilizing situation*
 Risk-Taking | *fine in taking risks, trying crazy ideas, or changing the situation*

Detailed | *needing very detailed information and being able to see, consider, and remember them*
 Holistic | *needing to see the big-picture first and difficulty to get or remember detailed information*

Contextual | *emphasizing the context in which actions occur – seeing from implementation side*
 Conceptual | *thinking from the abstract or general idea side of desired actions –philosophical view*

Subjective | *thinking about the process of (how to) achieve an objective more than the objective itself*
 Objective | *thinking about the objective more than how to achieve it –“watching the goal”*

Humanistic | *being highly people-oriented – highly sensitive toward (affected by) how people feel*
 Technical | *having a technical view like “how things work” – willing to explore & explain them*

I) Interview questionnaire

Aims:

- *What kind of diversity they want their students to learn about?*
- *Would thinking diversity be important?*
- *Is any specific tool or method being used for learning?*
- *If they need a method for educating thinking diversity, how should it be?*

Helping questions:

1. *What is the aim of having team diversity in your course?*
2. *Do you think students should understand team diversity for the course?*
3. *Do you think students are better to improve their understanding about team diversity, in general? –maybe at some point in school?*
4. *What topics do you think they should know about or is more important for the course? is it personality traits? thinking styles? team roles? cultural diversity? anything else?*
5. *Do you currently use any specific tool or method for that?*
6. *(if 5 is "Yes") Do you think it works well for you needs? Do students use it?*
7. *(if 5 is "Yes") Have you chosen it among some other tools/methods or was it the only one available that the time?*
- 8.a. *Do you think a measurement tool is needed for distinction?*
- 8.b. *OR it would be better if a method would somehow improve their understanding of thinking diversity, so that they can acquire information themselves in future (independent of use a measurement tool each time)?*
9. *How much time can be expend in the course to train students about thinking diversity? –what is your preference?*
10. *Is there anything more to add?*

J) Empty document for activity rhythm

In 6 steps, what would you do to extract iron from Antarctica?

STEP 1

STEP 2

STEP 3

STEP 4

STEP 5

STEP 6

Please give a title to each one of your steps:

1

2

3

4

5

6

Name: _____

K) Video of the experiment No.2



Bianca Ryan – And I Am Telling You I'm Not Going [A.G.T 06]

[YouTube] address: <http://www.youtube.com/watch?v=XcEo5H97CLM>

*"Humans are members of a whole,
in creation of one essence and soul
if one member is afflicted with pain,
other members uneasy to retain."*

*~Saadi, poet,
13th century*